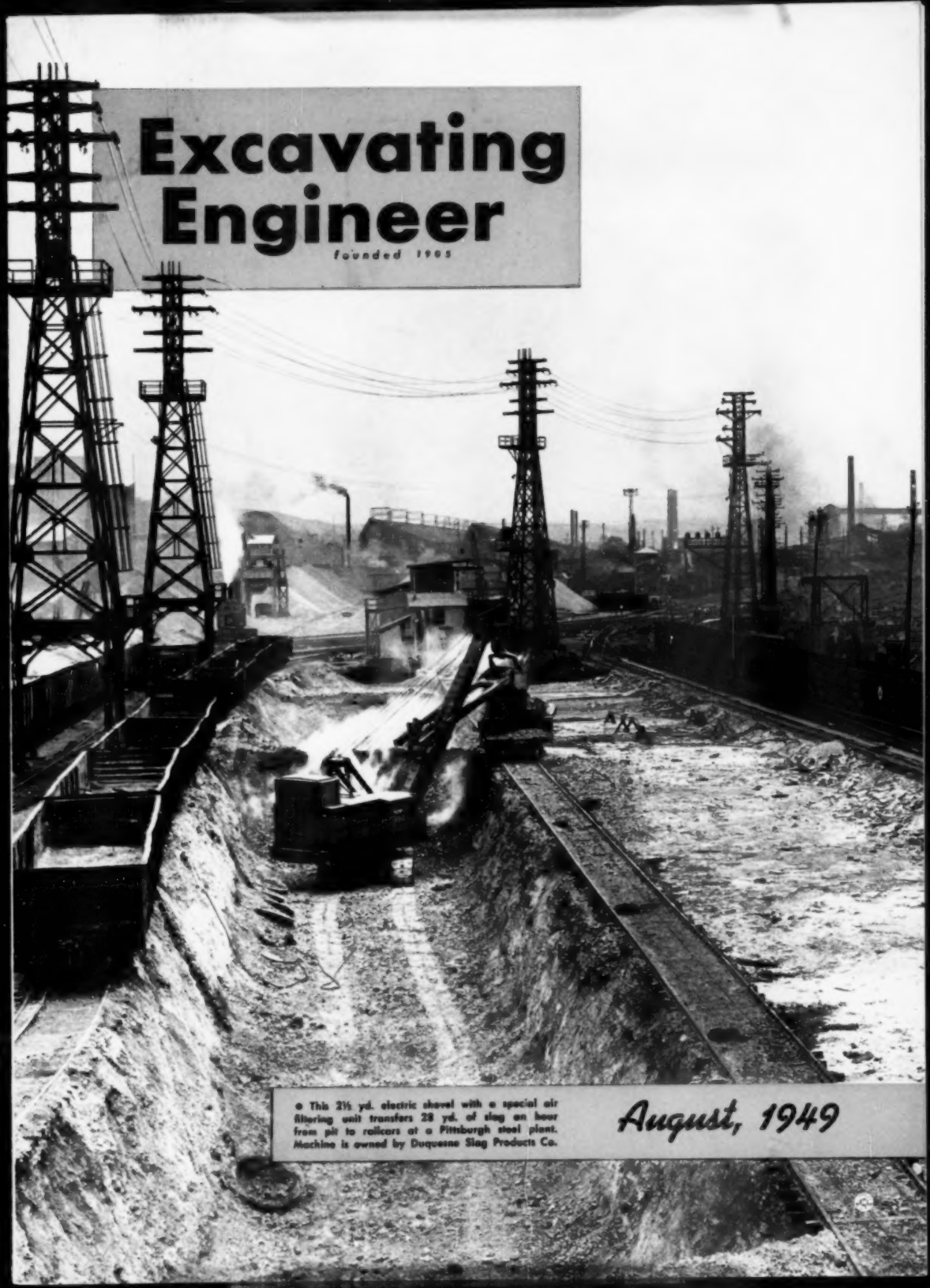
Excavating Engineer

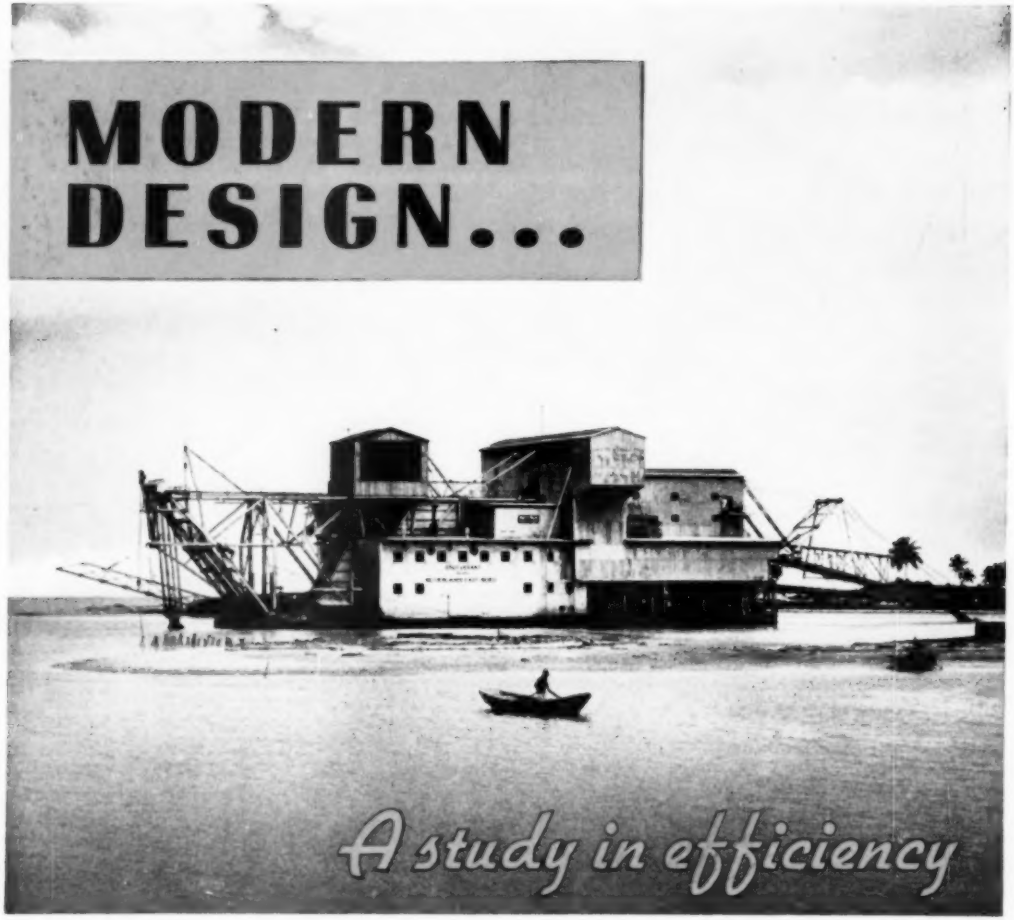
founded 1905



o This 2½ yd. electric shovel with a special air filtering unit transfers 28 yd. of slag an hour from pit to railcars at a Pittsburgh steel plant. Machine is owned by Duquesne Slag Products Co.

August, 1949

MODERN DESIGN...



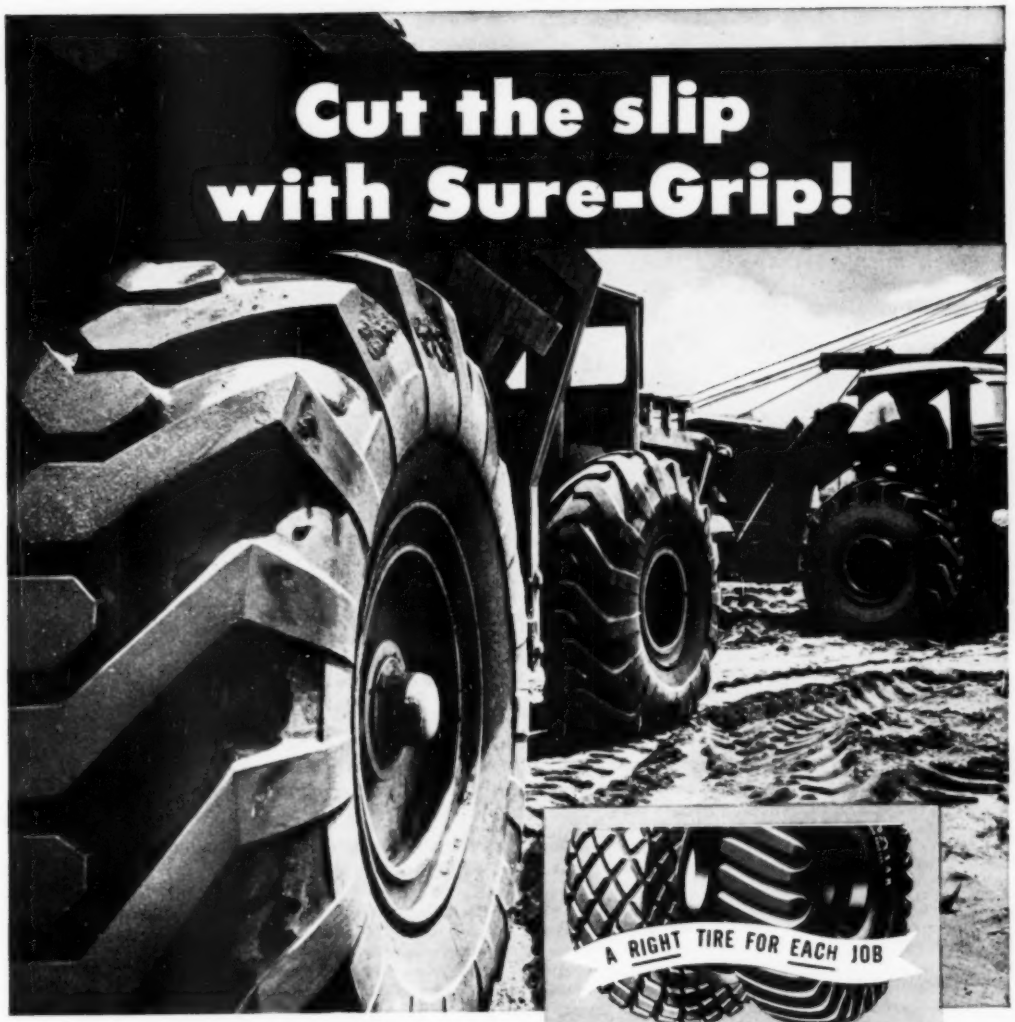
IN service since July, 1947, in the Netherlands East Indies, the placer dredge *Stuyvesant* has graphically demonstrated the superiority of Bucyrus-Erie modern design and construction with an outstanding performance record for tin recovery. The *Stuyvesant* features a greatly extended application of Ward-Leonard variable voltage control to provide the operating flexibility and smooth coordination of operating functions that means top working efficiency, increased production and economical operation. Bucyrus-Erie's unequalled experience in the use of this type of control for large excavating machines is but one reason why Bucyrus-Erie is uniquely qualified to build a placer dredge with the *years ahead* design to meet your output requirements.

22049C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Cut the slip with Sure-Grip!



SURE-GRIP — *in earth mover and grader sizes for maximum traction on drive wheels*

EARTH MOVER ALL-WEATHER *for drawn vehicles and general traction*

HARD ROCK LUG *for super-stamina in all rock work*

ONE look tells you why Goodyear Sure-Grip tires deliver more traction than other off-the-road tires. These huskies bite right in and grip — give positive pulling power — low-cost, long-lasting performance. That's because Sure-Grips have the Goodyear exclusive o-p-e-n c-e-n-t-e-r self-cleaning tread and extra-massive lug bars. No wonder, year after year, more yards are moved on Goodyear off-the-road tires than on any other kind. Remember, always BUY and SPECIFY Goodyear — *it pays!*

Sure-Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company

GOODYEAR

RESTRICTED --not by a DAM site!

The Wayne Crane Model 44 "Corsair," ½-yard, 18-ton machine, above as a utility crane unloading power cable at the Parker Dam Site in Arizona.

"Corsair" is not restricted to one job . . . it MOVES FAST from job to job — truck speeds on the highway. From the dam site at Parker to Needles, Calif., Kingman, Phoenix and Tucson, Arizona, to Boulder Dam, the Bureau of Reclamation's "Corsair" travels to its work . . . saves cost of permanent "local" equipment for infrequent loading and "handling" jobs.

For contractors, public utilities, railroads, municipal, county and state governments, "Corsair" offers the broad utility that "pays off" quickly in rental savings.

Today you need WAYNE CRANE advantages: fast 5½ r.p.m. swing, enclosed gears running in oil, oversize clutches and drums, anti-friction bearings, worm-driven boom hoist, full-vision cab and many other operational features which WAYNE CRANE provides. Converts easily to Shovel, Trench Hoe, Dragline, Clamshell, Pile Driver or Magnet Crane.

The Special Heavy-Duty "Corsair" Carrier is engineered for crane service. The extra large base plate of the upper-structure spreads the load evenly over the heavy box-type truck frame. Outriggers provide additional bearing support for maximum stability. Wayne Crane's performance, operating economies and low maintenance cut costs on any job.

WAYNE CRANE "Corsair" TRUCK-MOUNTED MODEL 44

Your Wayne Crane Distributor would like to show you HOW and WHY "Corsair" can make money for you. Ask him NOW.

Wayne Crane Division, American Steel Dredge Co. Inc., Fort Wayne 1, Indiana, U. S. A.

WAYNE CRANE MODEL 22
For yard work and home town jobs. Convertible to Shovel, Trench Hoe, Dragline, Clamshell, Crane, Magnet

WAYNE CRANE MODEL 22
1/2-yard, 5-ton, rubber-mounted, self-propelled, one-man operated single engine machine.

WAYNE CRANE DISTRIBUTORS MAINTAIN COMPLETE SERVICE AND PARTS FACILITIES

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Excavating Engineer

Founded 1905

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Allstates Constructors, Inc., are 22 months on the way to completion of the 1,500-day, $26½ million Clark Hill Dam contract which calls for about 1½ million cu. yd. of fill and over one million of concrete. The structure, 22 miles north of Augusta, Ga., will belt the Savannah River and link two states—Georgia and South Carolina.

Be Kind to Crawlers — by Ronald G. Richburg 22

. . . and they will reward you with long, relatively trouble-free performance. Although crawler mechanisms of modern shovels and cranes are designed to go almost anywhere, every operator should know the limits of sensible use. Lubrication procedures, peculiar to crawlers can do much to prolong their life.

Building Australia's International Airport — by H. Bowden Fletcher 24

Eleven million cu. yd. of fill are going into the making of a new international airport at Mascot, Sydney, Australia. To provide such a site, a river is being diverted, a creek widened, swamps filled, a bay dredged, a new sewer viaduct built, a traffic bridge constructed and sand dunes levelled.

Daytona Beach Gets $4 Million Sewer — by Henry C. Suter 28

Equipment belonging to eight contractors is almost ready to shove off after completing a new sewer network for a $4 million project in Daytona Beach, Fla. In 400 days construction men have moved 300,000 cu. yd. of earth and laid 100 miles of pipe for the gravity flow system.

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NINE NORTHWESTS on Hungry Horse Dam

Take a look at these pictures if you are figuring on rock work. Here is the beginning of the rock work on the $100,000,000 project which will eventually be the 4th largest and the 5th highest dam in the country.

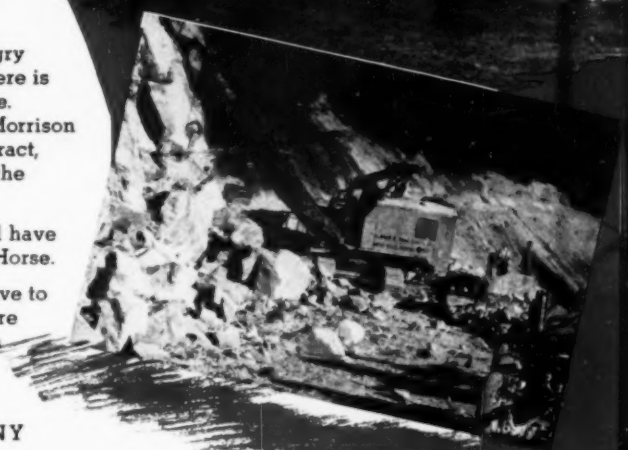
Anybody that knows the country around Hungry Horse in northwest Montana, knows that there is plenty of tough digging for a machine to handle.

And, anyone that knows the General-Shea-Morrison group of companies that are handling this contract, knows that they know equipment and buy the best for the heart of the job.

Northwest Shovels are real Rock Shovels and have been proved on hundreds of jobs like Hungry Horse.

If you have a real Rock Shovel you never have to worry about output in the Key Spots where the profits of a job begin. Plan ahead to have a Northwest and get the type of service Northwests are giving at Hungry Horse.

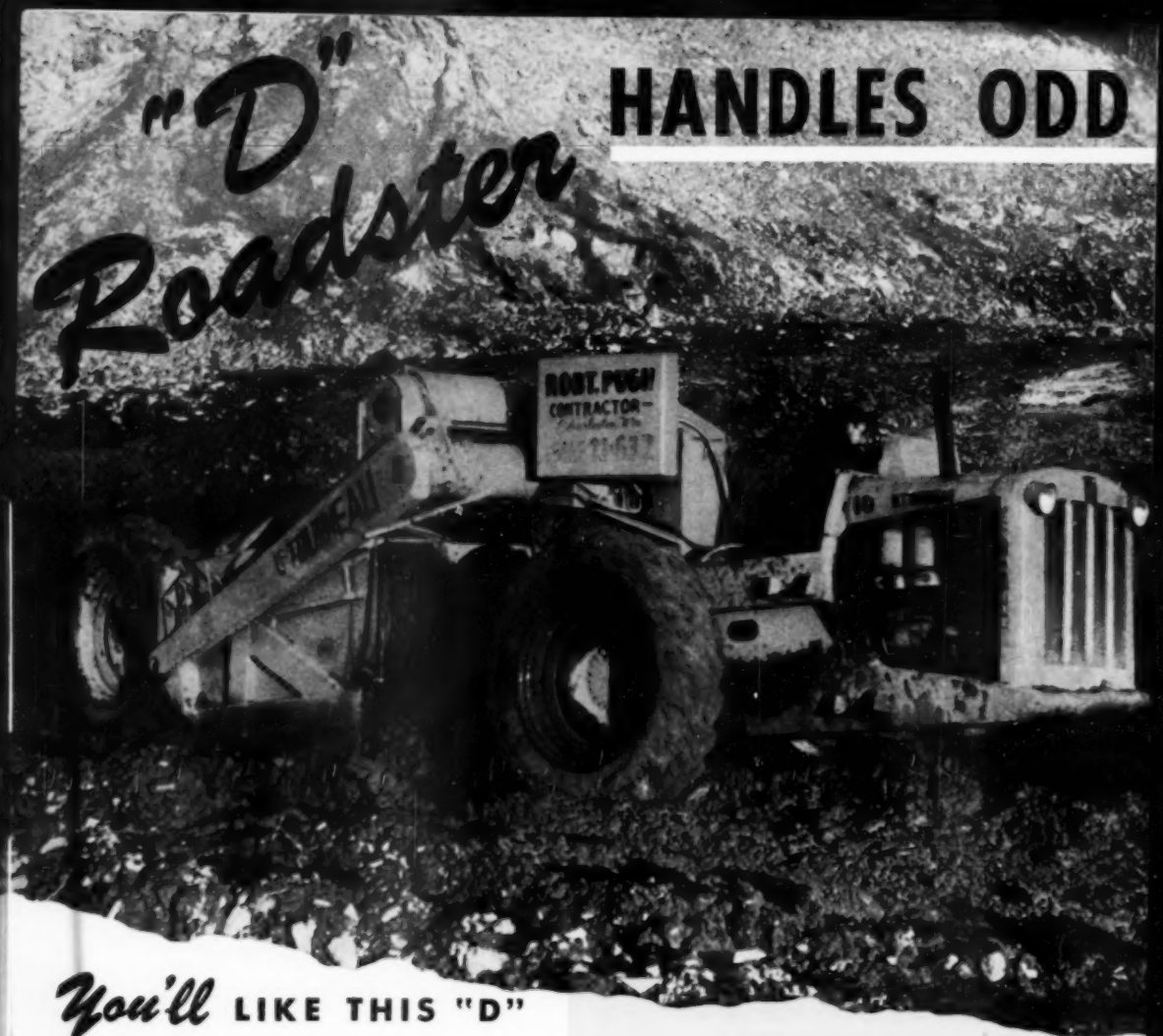
NORTHWEST ENGINEERING COMPANY
1506 Field Building • 135 South LaSalle Street • Chicago 3, Ill.



NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS-CRANES-DRAGLINES-PULLSHOVELS

"D" Roadster HANDLES ODD



You'll LIKE THIS "D" BECAUSE you get...

- **Self-loading** for economical 1-man operation on utility dirtmoving.
- **Ample 7-yd. capacity,** big enough to work profitably with pusher-loading in fleet operation.
- **25 m. p. h. speed** for faster job cycles... on-the-job moving... job-to-job travel.

For complete facts, call your nearest LeTourneau Distributor.

On 54,000-yard secondary road

Robert Pugh had only 174 work days to complete 54,000-yard highway relocation near White Sulphur Springs, W. Va. He added a high-speed "D" to his equipment fleet, and in spite of bad weather, finished project 100 days ahead of schedule. Pugh handled this secondary road job in shale, clay and gravel, with 3 crawlers and the rubber-tired "D". Heavy rain cut operating time to average of 4 days a week. Borrow pits, roads and fills were soaked most of the time. In soupy, wet mud, Roadster "walked" through with full loads, moved ⅓ rd *total yardage*. Pugh said, "It will work in any conditions a tractor-scraper will, can be operated and maintained for ¼th the cost!"

LETOURNEAU PEORIA, ILLINOIS (HIGH-SPEED RUBBER-TIRED) **TOURNAPULLS**

MORE WORK PER HOUR WITH RUBBER-TIRED POWER

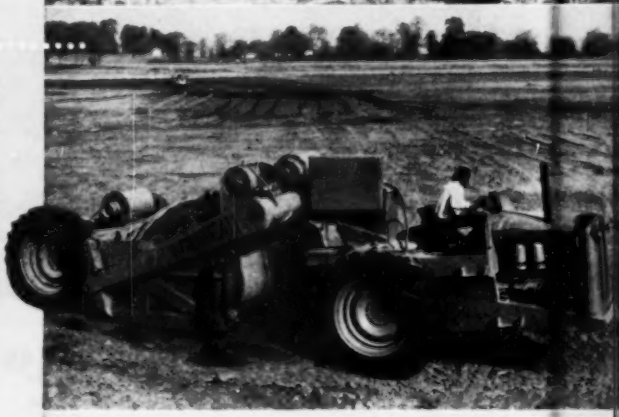
JOBS on PRODUCTION BASIS

On 1600-yard dam

Contractor Loren McLaury of Parkston, South Dakota, used a one-man D Roadster to build an earthfill dam for the AAA near Corsica. High-speed "D" quickly excavated a core trench in 2½ hours . . . then completed 1600-yard fill in just 17 hours. Material, black loam and clay, dry and hard, was self-loaded. Average cycle was 800′. Production for job averaged 94 cu. yds. per hour. Big tires (14.00 x 32) gave excellent compaction on the fill as Roadster spread material in thin, accurately controlled layers. Operator drove the highly mobile "D" into the job over county and state roads, drove it out after job was completed. No special hauling equipment was needed.

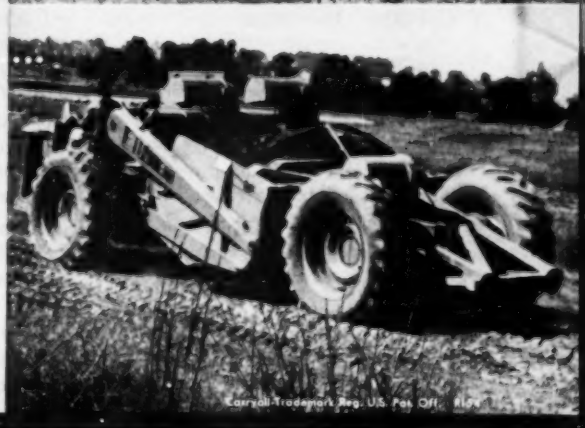
On 45,000-yard plant site

Roy Kohl, Ohio contractor, brought in a D Roadster on a 45,000-yard contract for an industrial plant site at Yellow Springs. Sloping field had to be leveled . . . railroad siding graded . . . reservoir excavated and diked with a 1600-foot retaining wall. Here's how Kohl's "D" compared with a 107 h.p. tractor and 8-yd. Carryall: On short 400′ cycles, the 100 h.p. "D" self-loaded 5.5 pay yards each load . . . averaged 25 loads for 137.5 pay yards an hour. That equalled production of the bigger crawler-scraper combination, which averaged 17 trips, 136.8 yards for same period. However, on 1900′ cycles, fast, rubber-tired "D" made 16.5 trips to crawler's 10 . . . moved 90 pay yards to crawler's 80 . . . an increase of 12.5%.



Small-yardage leveling job

Sam Glasgow had several small-yardage assignments on construction of a Philadelphia factory site . . . odd dirtmoving jobs too costly to handle with other equipment. Glasgow put a 7-yard D Roadster to work stripping top soil and building access roads into the site. He found it could get around the job fast, at 25 m.p.h. . . . self-load handily in the sandy clay. On 1700′ one-way hauls, the rubber-tired "D" dug, hauled and spread 10 loads an hour over rough going and through soft spots. Output for this one-man dirtmover was 50 pay yards per hour . . . a very profitable figure for these small-yardage assignments which are always the highest-cost dirt to move on any job.



To: R. G. LeTOURNEAU, Inc., PEORIA, ILL. Please send information on "D" ROADSTER:

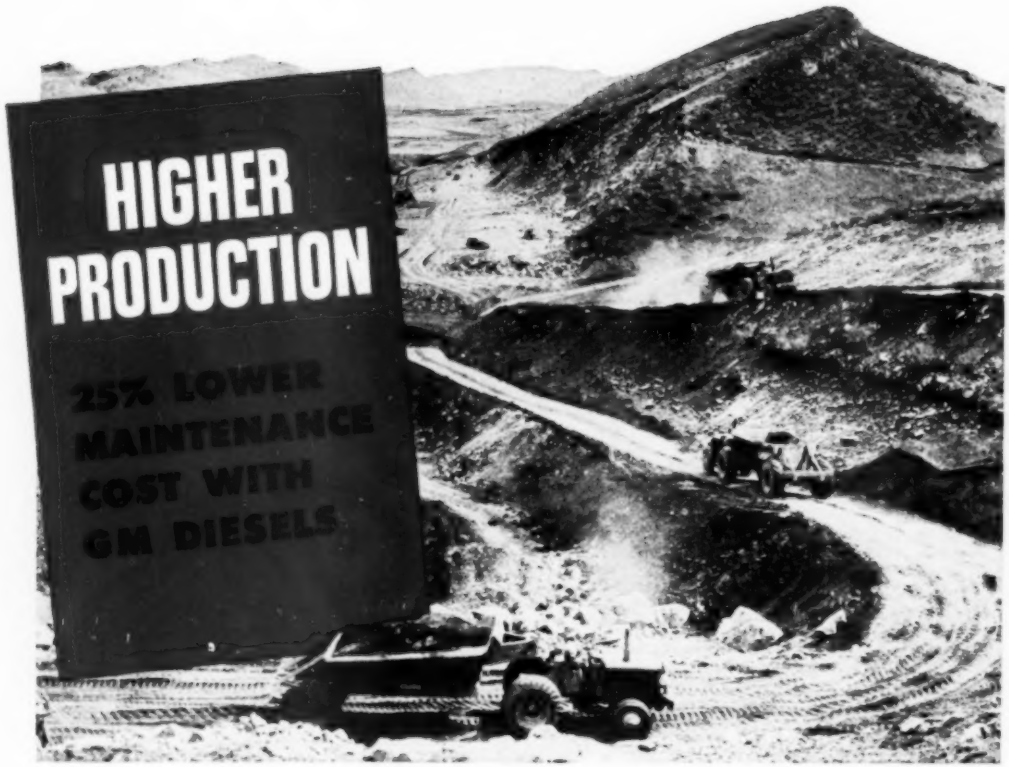
☐ Specifications ☐ Price ☐ Delivery ☐ Would like job analysis on present operations

NAME..... TITLE.....

COMPANY..... TYPE OF BUSINESS.....

STREET..... CITY, STATE.....

Would also like information on ☐ 13.5-yard "C" TOURNAPULL ☐ 180 h.p., 19 m.p.h. "C" TOURNADOZER



HIGH altitude and long haul grades are no problem with General Motors Diesels on the job. That's the profitable discovery made by Grafe-Callahan Company of Fort Collins, Colorado, on the 2½ million cubic yard Horsetooth Dam project on the East slope of the Rockies near Denver.

On the Horsetooth job (altitude 5300 feet) GM Diesel-powered Euclid trucks hauled 11½ yard (19½-ton) loads of wet gravel up 10% grades on 6-mile round trips averaging two trips per hour.

Starting with two GM 6-71 Diesel replacement engines, Grafe-Callahan purchased 8 new GM Diesel-powered Euclids and finally converted all 16 of their units to General Motors 2-cycle Diesel power.

Job manager Joe Seabury—a man whose opinion is worth noting—states, "I am being very conservative when I say that our maintenance costs have been cut 25% since we switched to GM Diesels. They stand up better and are much easier to work on. They have given us very good performance on this job."

When you need earth-moving machinery, or any heavy construction equipment, look to the *power*. Insist on GM Diesels and get more work done at lower cost. Write us or ask your construction equipment distributor for details.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 200 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

Reflections of a busy life

If a Bucyrus-Erie could write its memoirs, that would be an apt title . . . for Bucyrus-Eries, like this ½-yd. 15-B dragline, have a reputation for staying on the job and delivering profitable output through years of service.

Part of the long life of Bucyrus-Eries is due to superior design that meets destructive stresses with ample strength. Part of it comes from easy maintenance and accessible deck machinery that licks serious trouble before it starts. Part of it is due to top quality materials and workmanship — the best obtainable.

Add up these features and you'll see why so many leading contractors believe in being Bucyrus-Erie-equipped! 149E48C

BUCYRUS ERIE

The BEST buy Bucyrus, the best BUY in excavators

Bucyrus-Erie Company
South Milwaukee, Wisconsin

Zone the job for profits plus!

Watch your zoning point location—it's the key to greater profits. When hauls stretch out and costs go up, contractors like Snowden Construction Co., San Antonio, Texas, go to rubber. And for efficient rubber, they standardize and save on "Caterpillar."

On this 388,000-cu.-yd. relocation project on State Route 24 across Lake Dallas, Snowden has a line-up of 7 "Caterpillar" Diesel DW10 wheel-type Tractors—5 with "Caterpillar" W10 Wagons, 2 with "Caterpillar" No. 10 Scrapers. In a fill area 7500 ft. long, 20 ft. above lake bed, there are three bridges. With speeds up to 24.5 mph., the DW10s keep loads of 14 heaped cu. yds. rolling on round trips up to 3 miles. A "Caterpillar" Diesel No. 12 Motor Grader rounds out the line-up.

Standardizing on "Caterpillar" gives you the edge three ways. Operators work better with equipment of one familiar make. Units, designed by one manufacturer, team together with greater efficiency. And wherever the job may be, there's one well-equipped dealer to take good care of all parts and service needs.

There are more than 280 "Caterpillar" dealer places of business in the United States and Canada. Let the one nearest you show you how standardizing on "Caterpillar" can increase your profits on coming projects.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

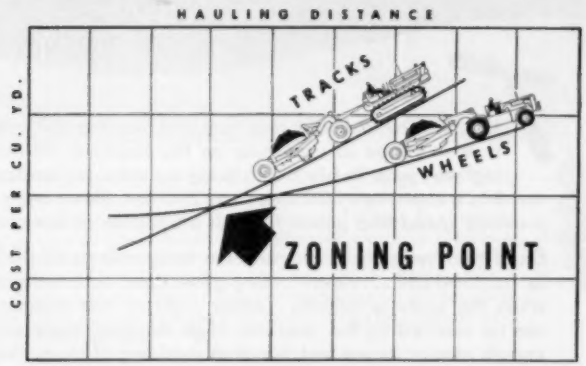
WHEN YOU THINK OF EARTHMOVING
THINK OF THE BIG YELLOW MACHINES
THAT FOLLOW THROUGH FROM START TO FINISH

24.5 mph. speed, booster steering and air brakes are only a few of many features of this DW10 wheel-type Tractor.

Hurrying up the shovel—a DW10 with W10 Wagon takes on 14 heaping cu. yds., while another DW10 with W10 waits its turn.

This husky No. 12 Motor Grader eats up work, doesn't eat up fuel and takes jobs calling for guts or accuracy in stride.

This ruggedly built No. 10 Scraper, with fast loading and dumping action, saves minutes and money every round trip.



WATCH YOUR ZONING POINT! Zoning point depends on grades, size of scrapers, loading methods and character of job. Too long a stretch for tracks is costly. So is too short a haul for wheels. Whichever side of the point you work, it pays to standardize on "Caterpillar." Only "Caterpillar" offers a complete line of Earthmoving Equipment:

1 Track-type Tractors and 'Dozers for "push" distances.

2 Track-type Tractors for loading and pulling Scrapers on medium hauls.

3 Wheel-type Tractors for high-speed hauls (with Scrapers or Wagons)—plus Motor Graders for finishing and haul road maintenance.

DIESEL ENGINES

TRACTORS

MOTOR GRADERS

EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO.
Box EE-9, Peoria, Ill.

Please send me, without obligation, booklet: "DW10s in Action."

Name _____

Firm Name _____

Address _____

City _____ *State* _____

Side-Dump Euclids

DO A WIDE RANGE OF WORK

- MINES
- QUARRIES
- CONSTRUCTION
- INDUSTRIAL

High speed is maintained with a load of 12.8 bank yards of heavy excavation at an airport job in Tennessee.

Low, wide hopper speeds loading and reduces spillage at an open-pit coal mining operation in West Virginia.

THE Side-Dump Euclid is a versatile hauling unit with a wide range of usefulness on the toughest off-the-highway jobs. Its big trailer body assures easy loading and has a capacity of 20 tons . . . a 200 h.p. diesel engine provides speed and power for high production at low cost.

Euclid twin hydraulic hoists raise the body and its 40,000-lb. payload fast . . . down-folding gates open automatically when the body is raised . . . either right or left dumping can be selected by the operator. High dumping angle and smooth interior assure fast, non-stop shedding of loads over the edge of fills and waste banks or in even windrows on the fill.

The Side-Dump Euclid is engineered as a complete unit and is ruggedly constructed for hauling rock, ore, overburden, and other heavy excavation. The big 24.00 x 25 tires on drive and trailer wheels give good flotation and traction on soft fills and difficult haul roads.

Your Euclid Distributor will be glad to discuss the many advantages of Side-Dump Euclids for your off-the-highway hauling jobs . . . call or write today.

The EUCLID ROAD MACHINERY Co.

CLEVELAND 17, OHIO

CABLE ADDRESS: YUKLID

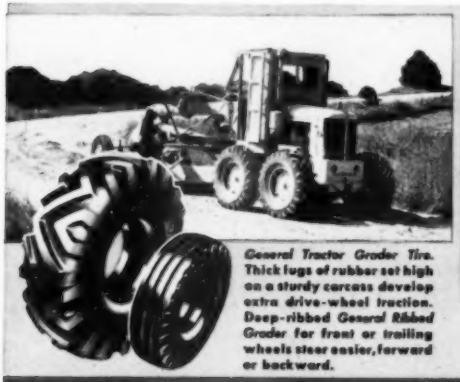
EUCLIDS *Move the Earth*

OVER ROUGH JAGGED ROCKS–IN MUD, GRAVEL, SAND–ON SMOOTH HIGHWAYS–

Generals meet all requirements

Where you have to go in off-the-highway to get the load, bring it out and over the road, use the *General H. C. T.* The sturdy, zig-zag tread digs deep for more traction in toughest going. Carries loads faster, safer, cheaper over the highway.

Where the job calls for most work off-the-highway use the *General L. C. M.* Tremendous lugs of rubber, designed in a self-cleaning tread, take bruising punishment under toughest conditions; carry the load over-the-highway smoother, safer, faster, cheaper.



General Tractor Grader Tire. Thick lugs of rubber set high on a sturdy carcass develop extra drive-wheel traction. Deep-ribbed *General Ribbed Grader* for front or trailing wheels steer easier, forward or backward.

For utility trucks choose the sturdy *General All-Grip* truck tire. Extra-deep, extra-thick tread blocks develop fast, self-cleaning action for more traction on mud and gravel roads —smooth rolling on the highway.

The GENERAL TRUCK TIRE

THE RUBBER CO., AKRON, OHIO

THE TIGER BRAND SPECIALIST VISITS THE PENN-LINCOLN PARKWAY

and learns a trick or two about wire rope care

"I stopped to see Charlie Dinardo the other day. He's in charge of Dinardo, Inc.'s job of building the 980-foot concrete arch bridge over Nine Mile Run in the Penn-Lincoln Parkway project at Pittsburgh. It's one of the biggest concrete arch jobs in the country in recent years.

"About 15,000 yards of ready-mixed concrete go into this bridge, and 98% of it is being poured by cranes—all equipped with Tiger Brand Wire Rope. They were pouring about 250 yards a day, using a one-yard bucket on a crane equipped with a 105-foot boom and 18-foot jib. In addition to the pouring, the four cranes have handled all steel erection and form setting on the bridge. A job like this really puts rope to a test!

SUPERINTENDENT Charlie Dinardo tells the Tiger Brand Specialist how he obtains maximum life from his Tiger Brand Wire Rope on this rugged job.

"Charlie says he is getting plenty of service from his Tiger Brand Rope. It holds up for three months' steady work on the hoist, and he hasn't replaced a boom rope in over a year.

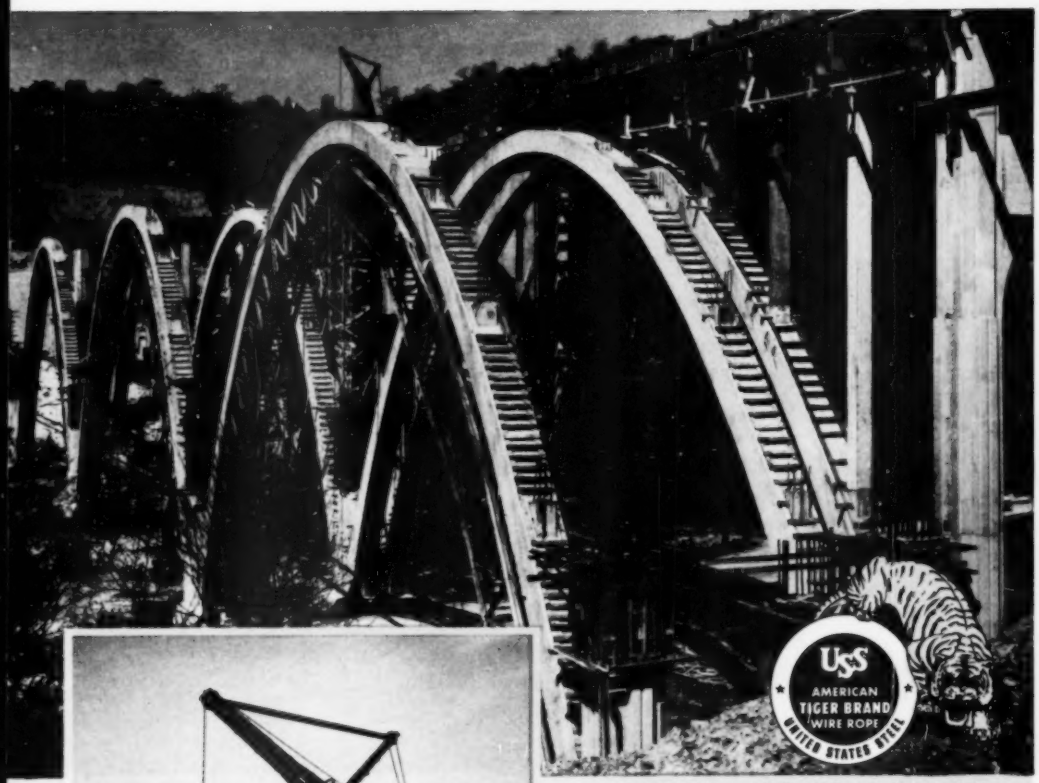
"Charlie passed on a couple of tips on how he gets this kind of service on such a rugged job. First, he uses nothing but Tiger Brand. Second, he observes extra precautions during installation, being especially careful not to introduce any twist into the rope.

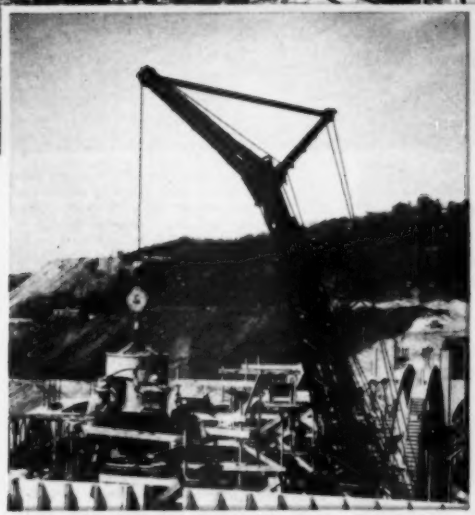
"That's this veteran contractor's method of obtaining exceptionally long rope life. I'm glad to pass it along to you."

ARE YOU GETTING THE MOST FROM YOUR WIRE ROPE?

The TIGER BRAND Specialist—an experienced field service engineer—draws on his own experience and that of veteran construction men like Charlie Dinardo to help you get the best performance from your wire rope at the lowest possible cost.

He'll be glad to talk over your problems with you and make suggesitons. Meanwhile, write for our booklet "Valuable Facts About the Use and Care of Wire Rope." You'll find it helpful.





980 FEET LONG . . . 100 feet high at the lowest point in the valley . . . this three span concrete arch bridge carries the new Penn-Lincoln Parkway west toward the Squirrel Hill Tunnels in Pittsburgh, Pa. Dinardo, Inc., Pittsburgh, is the contractor.

98% OF THE CONCRETE in this job is being poured by cranes—equipped with Tiger Brand Wire Rope.

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Rampart Across the Savannah

• On Georgia side of Savannah, these two American R-20 revolving cranes handle concrete for Clark Hill Dam. Stiffleg derricks (left) place concrete in west retaining wall. Cofferdam can be seen behind trestle.

Allstates Constructors, Inc., are 22 months on the way to completion of the 1,500-day, $26½ million Clark Hill Dam contract which calls for about 1½ million cu. yd. of fill and over one million of concrete. The structure, 22 miles north of Augusta, Ga., will belt the Savannah River and link two states — Georgia and South Carolina.

by C. H. McCormack

Office Engineer, Allstates Constructors, Inc.

THE southern accent down Georgia way these days is on the construction of Clark Hill Dam, located in two counties of different states—Columbia County, Georgia, and McCormick County, South Carolina. Allstates Constructors, Inc., a joint venture of six contractors, is closing in on the completion of the initial construction stage on the Georgia side of the dam, first in a series of 11 planned by the Corps of Engineers to turn the waters of the Savannah River to beneficial ends.

Savannah River drains a large part of southwest South Carolina and northeast Georgia. After completion of the series of proposed structures, approved by the Federal Flood Control Act of 1944, the populous of the Savannah River Basin will no longer be victim to bad floods, will have more electricity, and a more navigable river.

Clark Hill Dam will be a concrete structure, 2,282 feet long and 200 feet high with a maximum width of 210 feet from the upstream face of the dam to the downstream end of the spillway bucket. The lake impounded behind the dam will have a 1,200-mile shoreline, will be 37 miles long. It will cover 58,000 acres at average pool level. Earthfills at each end of the dam will have a maximum height of 150 feet and will constitute 3,400 feet of the total length of 5,682 feet.

The earthfill at the west end of Georgia side of the concrete dam was built by Boyle Construction Co., Sumter, N. C., under contract with the Corps of Engineers for $240,720. An impervious earth core was placed in the center of the structure and then blanketed with pervious material obtained from a borrow pit one mile away. Tournapulls placed nearly all of the 500,000 cu. yd. by Aug., 1947, before the prime contract was let to Allstates Constructors, Inc. (Nov. 11, 1947).

Members of Allstates Constructors, Inc.

The group is made up of Walsh Construction Co., Davenport, Iowa; B. Perini & Sons, Inc., Framingham, Mass.; Ralph E. Mills Co., Salem, Va.; Blythe Bros. Co. and J. A. Jones Construction Co., both of Charlotte, N. C., and Massman Construction Co., Kansas

City, Mo. Their bid of $26,456,197 was $1,400,000 lower than the next higher bidder.

The prime contract entails pouring of 1,100,000 cu. yd. of concrete for the main structure, placing 1,435,000 cu. yd. of earthfill in the terminal cones on either side of the dam, and installation of mechanical equipment required for pool regulation—23 tainter gates and seven 20-ft. penstocks. The combination group of contractors has 1,500 days to complete the contract with liquidated damages set at $600 a day.

An almost straight production line on the Georgia side of the river has been set up by the contractor. Material is taken from a quarry developed for this job, through the crushers and screening structures to the stockpiles and finally to the concrete plant and damsite itself. Distance from the quarry to the damsite is about one mile.

Fill Work

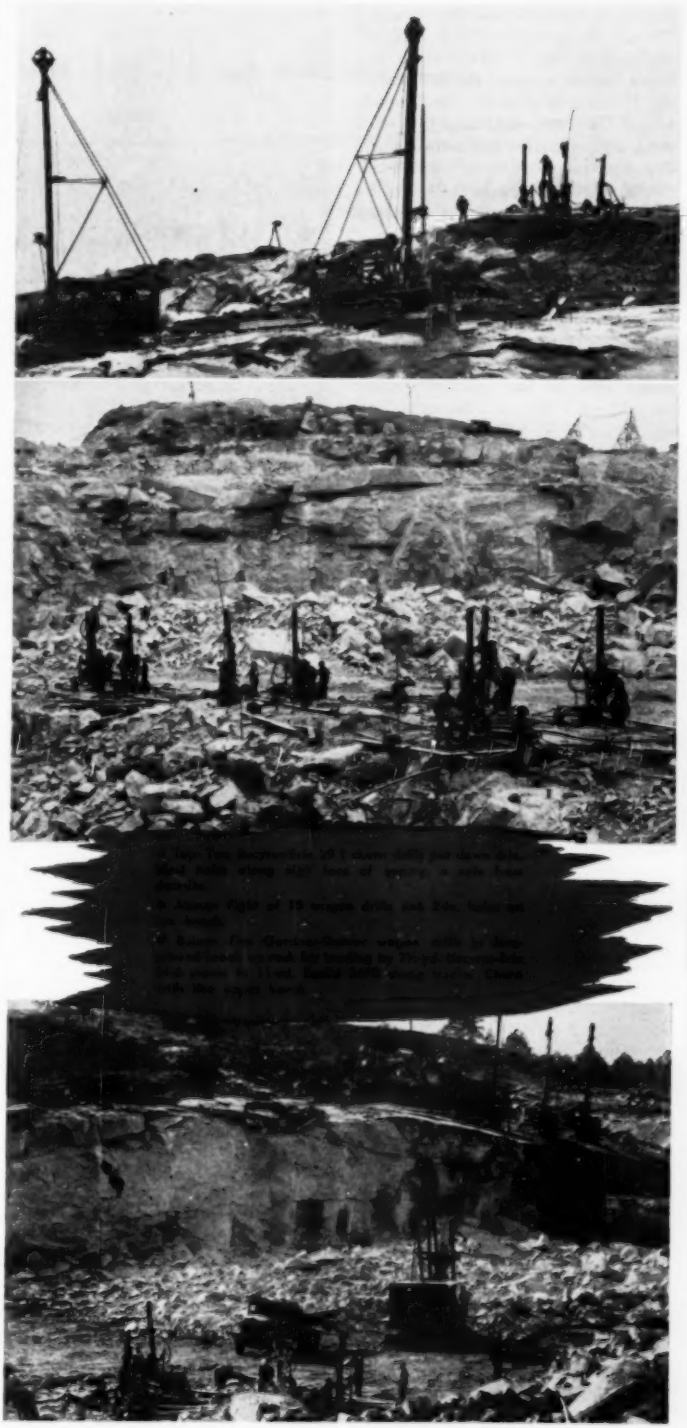
Site preparation prior to the arrival of Allstates Constructors was accomplished under a subcontract held by Cherokee, Inc., of Columbia, S. C. This firm also performed the fill work for the Corps of Engineers on the east or South Carolina side of the river.

Fill work—1½ million cu. yd.—was started first. A 1½-yd. Northwest 6 shovel loaded four 15-yd. Terra Cobras and eight 12-yd. Euclid bottom dumps at the borrow pit on the upstream side of the dam ¾ mile away from the site. By Sept., 1948, six months ahead of schedule, Cherokee was finished with this part of the contract. Site preparation for Allstates on the Georgia side was done during March, April and May of 1948 because the east bank of the river was too wet to permit work. Allstates personnel began arriving two months after they received the contract.

Site Preparation

Roads and railroads had to spring up over the plant site prior to any major dam work. Cherokee moved 50,000 cu. yd. in the Terra Cobras and Euclid bottom dumps, loaded by the Northwest. The hauling units took their loads to the fills necessary for roads, railroads, building and equipment sites.

Before active work could begin, the quarry area also had to be stripped of earth and weathered rock. Overburden removal totalled 275,000 cu. yd. Cherokee moved 80,000 yd.; Allstates handled the rest. Two 1½-yd. Northwest 6 draglines and three shovels—a North-



west 6, a 5-yd. Marion 111-M and a 2½-yd. Bucyrus-Erie 54-B did the major stripping. Terra Cobras and Euc's hauled some of the material to the switchyard area on the Carolina side of the river; some went into plant roads and railroads; and a small quantity was wasted along the river bank. About 40,000 cu. yd. is stockpiled for later use as riprap on the upstream side of the earthfill.

Stripping uncovered a domed granodiorite formation (intermediate formation between granite and quartz diorite) roughly serrated on two sides with many potholes of weathered rock running deeply into the granite formation.

Quarry Development

Quarry development got underway on the first bench (at the level of the exploratory area prospected by the Corps of Engineers). Ten Ingersoll-Rand X71WD and three Gardner-Denver D99 wagon drills with 2-in. bits drilled 12- to 14-ft. holes in a 4-ft. pattern. Hercules Gelamite was used for blasting when operations began—about eight to ten pounds of powder per hole. Holes on this lower bench still are put down in a space pattern of 4-ft. centers but are now 16 to 18 feet deep. About 12 pounds of 60% Gelamite is used per hole; breakage has been excellent.

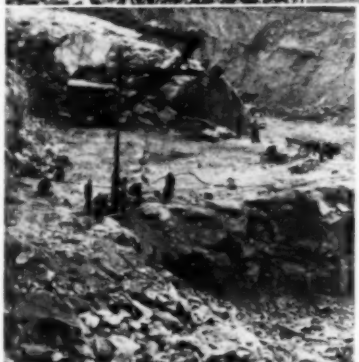
Wagon drills are used most extensively in the low rough section of the quarry. Deep drilling to develop a high face is done by three Bucyrus-Erie 29-T blast hole drills operated on a 24-hour basis. They put down 6-in. holes, 55 feet deep on a 20x25-ft. pattern. Rate is 1.98 feet per hour. Each hole is loaded with approximately 600 pounds of Hercules Gelamite or Herculite, with major shots—eight to 18 holes—fired every 10 days. Dynamite is hauled to the area by Chevrolet trucks. Clean-up work is done by a ¾-yd. Northwest 25 backhoe, a 1½-yd. Lorain 820 shovel and a Caterpillar D-8 dozer.

Large pieces of granite occasionally break loose when a heavy shot is fired along the high face. These pieces are then drilled with a Sullivan Jay Hydro drill mounted on a Mack truck for easy mobility, and then shot simultaneously with dobie shots. Such shots are used to break up the few large pieces of granite present after every firing. Seven Ingersoll-Rand 750 Jackhamers break up chunks of weathered rock.

Granite in the high face is very dense and of very fine grain. As a result, bit wear is exceedingly high—blast hole drill bits need sharpening after every 2.1 feet with 5.9 bits used per 8-hr. shift. Because of the high bit wear, a bit sharpening shop had to be set up on the job site. The following equipment, working an 8-hour day, has been able to keep ahead of the well drills—a Bucyrus-Erie 12 bit dresser, a Johnson 1350 forging furnace and a Johnson 1347 tempering furnace.

Air supply for operating the wagon drills and jackhammers comes from the compressor building which houses two 2,700-cfm and two 1,000-cfm Ingersoll-Rand compressors. Well drills are electric motor driven, the current coming from the substation supplied by the Georgia Power Co. Two Case tractors hauling farm wagons supply drill steel for all the rigs. Three 4-in. Gorman-Rupp gas-driven pumps keep the quarry dry.

The face as now developed is approximately 60 feet high and the hole spacing has been sufficient to break the rock to shovel handling size. Quarry operations turn out 450 tons every hour, 24 hours a day, on a 5-day schedule.



• **Above Left:** This view of a 2½-yd. Bucyrus-Erie 54-B shovel working in the quarry shows the tough rock which had to be handled.

• **Above:** One of the eight Euclid 36 FD trucks operating in quarry gets load of rock from 54-B dipper. Haul to primary crusher is ¼ mile.

• **Left:** A 1½-yd. Northwest 6 shovel works in another part of quarry.

• **Below:** One empty Euclid waits its turn while another is loaded by 3½-yd. Marion 111-M shovel.

Three Shovels Load Trucks

Material that forms the final aggregate for the dam is loaded by three shovels—a 1½-yd. Northwest 6, a 2½-yd. Bucyrus-Erie 54-B and a 3½-yd. Marion 111-M. Eight 11-yd. Euclid 36 FD trucks haul the rock to its first processing unit, ¾ mile away—the primary crusher, a Superior McCully

42-in. gyratory. Reduction is to seven inches.

Flight One of a series of 15 conveyor belts totalling 4,400 feet in length takes the 7-in. material to the secondary crusher, a Telsmith 20-B gyratory. The next stop on the way to the damsite is the first screening structure which is used to stockpile 3-in. and 6-in. rock and to crush to 1½-in. in a Symons 4¼ cone crusher.

The second screening structure houses a Telsmith 48 gyrasphere crusher for making ¾-in. material. At this point, crushed rock is conveyed to stockpiles for 1½- and ¾-in. rock. An 8x12-ft. Marcy rod mill reduces the minus ¾ stone to sand which is graded in a Dorr bowl classifier and then stockpiled.

Altogether there are five stockpiles. Four sizes of stone are stocked in 5,700-ton piles by the conveyor belts ending on stone ladders—they reduce breakage in dropping the material to the piles. The sand is stored in a 20,000-ton pile by a shuttle conveyor.

Aggregate storage piles rise into the air over a 700-ft. tunnel housing another 36-in. conveyor belt. This conveyor is loaded through gates under the piles, and carries all materials to the rinsing screen where the 1½-in., 3-in. and 6-in. stone is washed to remove dust collected in the crushing, screening and stockpiling processes. Sand and ¾-in. rock are by-passed at this screen—these aggregates require no rinsing.

Last of the conveyor flights leads to the 750-cu. yd. C. S. Johnson mixing plant where three 4-cu. yd. Koehring mixers, electric-driven and air-operated, turn out 200 cu. yd. of concrete every hour. Two types of cement are used to produce an approximate blend of 75% portland and 25% natural cement. The material is brought to the job site in bulk railroad cars, unloaded by screw conveyor and lifted into 7,500-bbl. silos with a bucket elevator. Two silos, one for portland and the other for natural cement, are situated to one side of the mixing plant.

Ice Plant

On the other side of the plant are the ice manufacturing plant and ice storage bunker. Allowable maximum temperature of the concrete is 70° F. and the minimum 40° F. During the summer months, all water is added to the concrete mix in the form of ice. But during the few cold months of the year, both aggregates and water have to be steam heated.

Five 30-ton Vilter Pak ice machines are operated, using ammonia as a coolant to produce the ice required during the hot weather. Ammonia is supplied through two 40-ton Frick ammonia compressors, housed in a second compressor building adjacent to the mixer plant. Water for all operations on the entire project, as well as for the concrete mixing, flows by gravity from a 1½ million-gal. reservoir built on the side of the haul road opposite the storage piles.

The short temperature range of 30° made it necessary to set up an extremely flexible plant to meet varied conditions. All concrete mixing in the plant is handled through an automatic control board so arranged that any one of 12 different mixes can be made by turning the mix selector to the desired number-designated mix, then operating the automatic or manual master control switch for batching all materials.

On the last lap of the journey to the damsite, concrete is taken in 4-cu. yd. C. S. Johnson air-operated buckets by flatcars hauled by Plymouth diesel locomotives. At the damsite where pouring began last October on the Georgia

• Right: Taken from headhouse of concrete mixing plant, this shot shows layout of crushing plant. Stockpiles are fed by conveyors which lead from two screening units.

• Below: This photo shows the beginning of aggregate production line to damsite. In foreground is primary crusher, a Superior-McCully 42-in. gyratory, which reduces rock to seven inches. Next in line are secondary crusher, a Telsmith 20-B gyratory, and the surge pile.

• Below Right: These aggregate stockpiles are above 700-ft. tunnel which houses belt conveyor which takes material to mixing plant.

side of the river, three American R-20 revolver cranes, mounted on the construction trestles and equipped with 125-ft. booms, place concrete in the dam structure and spillway buckets. A stiffleg derrick places concrete in the west retaining wall.

Twenty-seven blocks, 21 spillway buckets and six sections of the west retaining wall are being built in the present construction stage. As many as ten pours are required in a 24-hour period to maintain the concrete schedule and utilize output of the plant.

Use Nine Different Mixes

Composition of concrete varies within each block—the interior requires 6-in. aggregate material while 3-in. materials are necessary at positions of heavy reinforcement. Because of this varied composition, a telephone system has been set up to maintain close contact between the mixing plant and pouring operations. At present nine different mixes are set up on the control board and the operator often changes mixes as frequently as 15 times per hour—making this a real "short order" mixing plant.

Concrete is poured in vertical lifts of 2½ feet until all concrete in a block is 10 feet above rock foundation. It is then placed in 5-ft. vertical lifts at intervals of no less than five days between pours. Vibrators used are all 90-cycle, 2-man, electric-driven Jackson V-54 AA1 models.

Wet Sand Blast Pour Surfaces

Surface of each lift must be wet sand blasted to remove all deleterious material and all laitance normally found at the top surface of any pour. The wet method of sand blasting at Clark Hill Dam goes like this: Sand ¼-in. and smaller is passed through a sand dryer to remove all moisture, then loaded in a railroad sand car, and transported by locomotive to storage under the construction trestle. Sand is then fed into a pressure tank after which it goes through a 1-in. nonstatic hose to the nozzle where water is added to keep down the dust and permit visual inspection as cleaning progresses. Sand and water are supplied to the tungsten carbide ⅜-in. nozzle at 100 psi.

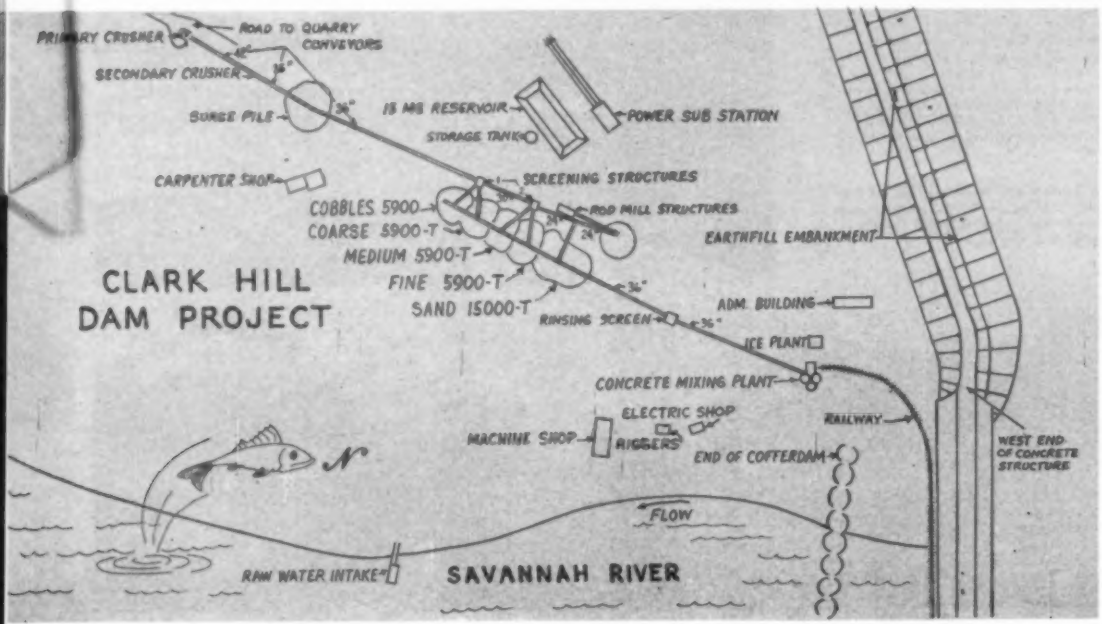
An alternative method that is used is the wet cutting process. This air-water cutting is done at the optimum time of concrete setup to achieve maximum cleanness with minimum wastage of placed concrete.

Cantilever forms, held in place with tyloops and 1-in. bolts, are used for all pours above rock. Two days after a pour is made aluminum "A" frames weighing 225 pounds are manhandled to the surface of the pour, and all forms are raised for the next lift. Cantilever forms are built in 10-, 12- and 16-ft. lengths, and have an overall height of 10 feet. These are used on the upstream and downstream faces of the dam, as well as at the contraction joints between blocks. Installation of reinforcing steel, embedded items, and the placing of U. S. Rubber absorptive form lining "Hydron" is done in the 5-day interval between pours.

Major work on the dam has been split into three stages of construction. When the first stage is completed shortly, 272,000 cu. yd. of concrete will have been placed on the Georgia side of the river. This work will provide eight openings through which the river will be diverted while the second stage is under construction. These openings will be achieved by leaving eight of the blocks of the spillway section 20 feet below the adjacent blocks, thus allowing the entire river flow to be by-passed.

Cofferdam Built in 1947

The cofferdam now in use was constructed late in 1947 by Hardaway Construction Co., Columbus, Ga., under a Corps of Engineer contract for $844,200. Contract also included dam foundation work which was finished in August, 1948. The cofferdam is built of 33 cells, 47 ft., 9 in. in diameter, tied into the west embankment on the Georgia side of the Savannah with cutoff walls. All sheeting is Bethlehem Sp-6a and standard tees are used at

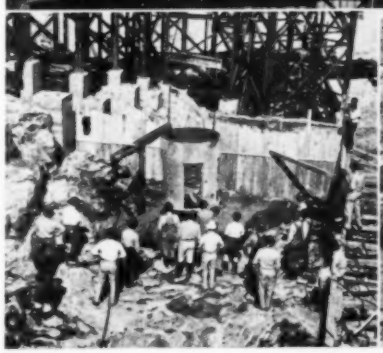


• Left: Grapple on an American R-20 revolver crane (behind camera) picks up 4-yd. Johnson air-operated concrete bucket, while second crane in line swings another bucket into position. Third crane is placing concrete in one of blocks for dam. Flatcars (one in foreground and another below third crane) are hauled by Plymouth diesel locomotives.

• Below: Flatcars carrying concrete buckets line up along tracks beneath cranes whose 125-ft. booms crisscross in the sky.

• Bottom Left: Concrete placing at Clark Hill Dam began on Oct. 15, 1948. This picture shows ceremonies at pouring operations when first bucket was let down.

• Bottom Right: Concrete streams from bucket under guidance of workman. By the time the first stage construction work is finished, 275,000 cu. yd. of concrete will have been placed on the Georgia side of the dam.



diaphragms. The area within the cofferdam is being dry with two vertical-lift Byron-Jackson 8QH pumps capable of handling 6,000 gpm each, and with four 6-in. Gorman-Rupp heavy-duty pumps. A 20-in. Dayton-Dowd AX22 horizontal centrifugal pump is kept as a standby unit.

This cofferdam will be pulled and redriven on the Carolina side of the river for the second stage of the work. Thirty-one 47-ft., 9-in. diameter cells are required. Sand fill in the cofferdam now in use will be placed in the new cells by hydraulic dredge. Additional sand is available at a sand island just downstream from the existing cofferdam. Longest pumping distance will be 3,000 feet, and, as both arms of the cofferdam will be built simultaneously, two pump lines will be used. Approximately 80,000 cu. yd. of fill will be placed in the cells.

Second Cofferdam

Part of the second stage cofferdam will be built inside the existing dam. Two of the existing cells will be used in the new work. Rebuilding of the cofferdam is expected to take about four months, with work being done on an intermittent basis. The area enclosed by the cofferdam will be dewatered with ten 6-in. Gorman-Rupp, one 9,000-gpm Dayton-Dowd, and two 5-stage, 6,000-gpm Byron Jackson pumps.

In the area protected by the second cofferdam, all earth at the foundation of the dam and powerhouse will be excavated. When this is complete, the weathered and unsound rock will be removed and concrete placing will start once more. This section of the dam will have seven 20-ft. and two 4-ft., 6-in. penstocks installed as well as all the trash racks and tractor gates required for them. The roadway at the top of the dam will be built when this section of the structure reaches its full height. When the concrete has reached its final height, the major fill work involving 1,435,000 cu. yd. mainly in the terminal cones at either end of the dam, will be begun by Allstates.

Major problem of the third stage construction period will be shutting off the river flow through the first stage work and the placing of all concrete up to the spillway crest. Normal river flow

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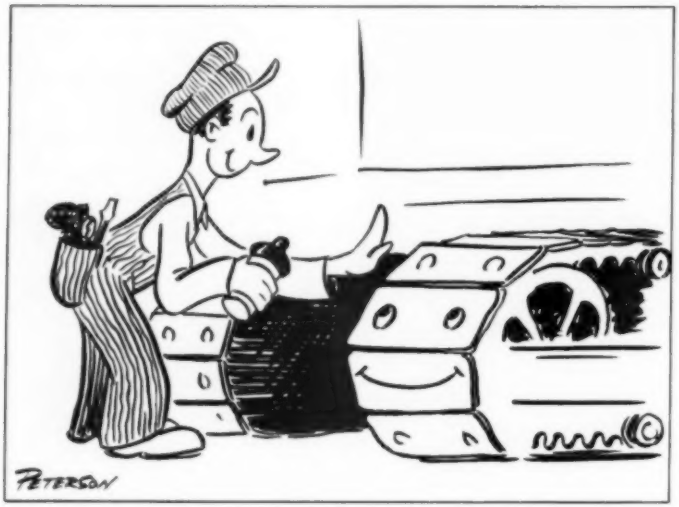
Be Kind to Crawlers



. . . and they will reward you with long, relatively trouble-free performance. Although crawler mechanisms of modern shovels and cranes are designed to go almost anywhere, every operator should know the limits of sensible use. Lubrication procedures peculiar to crawlers can do much to prolong their life.

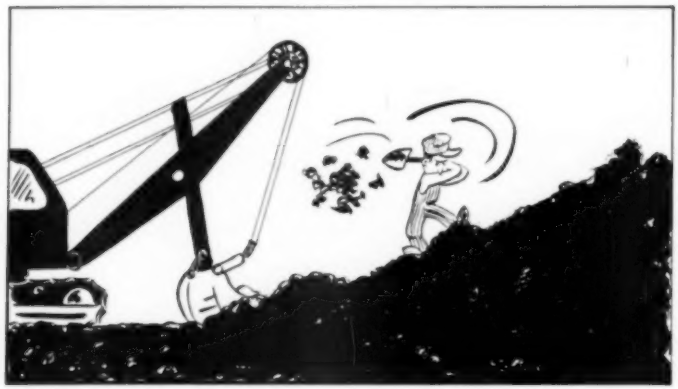
by Ronald G. Richburg
Master Mechanic, Richburg and Sons, Winchester, Mass.

IT IS obviously unnecessary and expensive to replace any of the propelling parts on shovels and cranes when failure has come about through carelessness or ignorance. In the opinion of one who has operated and maintained all types and makes of excavators in all kinds of work for 30 years, the crawler unit deserves more attention than it usually receives in discussions of operation and maintenance. Let's cover some of the basic points in a sensible crawler care and maintenance program.

Most crawler troubles result from steering—and many of these could be avoided if the operator were always to consider the type of material in which he is working. If the machine is operating in loose sand, stony or heavily sodded ground or mud, for instance, there is always a possibility that crawler treads may become dirt bound. In this type of material, the operator should never apply full power to propel without first rocking the treads back and forth slowly to give lodged dirt a chance to work out from between them.

It is important to make turns whenever possible in a series of short steers. This way there is less opportunity for treads to become clogged. If a sharp steer is necessary, it's good practice to take advantage of a slight hump or hard spot on the ground. The tread to be braked is driven midway over the hump which then acts as a pivot, greatly easing the turn. Still better, some operators use a block of wood which is placed on the ground at the turn point for this purpose.

• The operator should rough out a road for his machine.



Steer Both Right and Left

Try to alternate steers from right to left—avoid many consecutive steers with one tread alone. If one tread is used more than the other it will wear faster and require more adjustment than if both are used.

Whenever possible, steer uphill regardless of whether travel is uphill or down. Steering uphill puts less strain on the locking mechanism and treads will cut quicker. If it is necessary to travel up or down an extremely short steep grade, always try to line up crawler treads so that steering won't be required on the grade.

When steering on a downhill grade can't be avoided, the operator should not force the steer if the pivoting tread does not want to hold. Preferably, a block should be put in front of this tread.

Sometimes after a machine has been steered during downhill travel, the

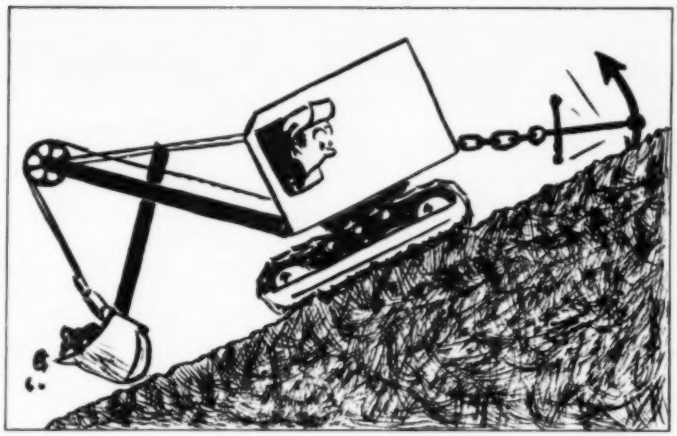
effect of machine weight on the tread lock mechanism will prevent release of the lock. It may not be possible to release this pressure on the lock even if the machine is moved back uphill by propelling the free tread.

The operator may find it necessary to travel back so far to unlock the tread that he has gone beyond the original starting point of the steer. If the locking device still refuses to release, it may be necessary to use such special means as crowding the dipper (if the machine is a shovel, and the crowd machinery is not interlocked with propel) into the ground to push the machine uphill and relieve pressure on the steer lock.

Put Block Behind Treads

The holding or locking brake should never be relied upon completely especially in hard digging on a hill. Always put a good block behind treads when working on a steep grade. If a holding brake lets go and the machine starts to roll down a hill, it is almost impossible to make a jaw clutch engage and friction clutches will burn out quickly. It is usually unnecessary to block a machine using ratchet locking pawls, except on very steep grades.

Whenever a long travel or uphill climb without having to make a steering movement is encountered, it is good practice to release travel friction occasionally and reverse direction briefly. This will tend to keep jaw clutches well meshed and prevent a serious accident which might occur should they work out of mesh (and the operator lose control of the machine). This precaution is particularly important when jaw steering clutches or main travel clutch is worn. Don't try to engage or disengage jaw clutches too quickly. Especially in severe cold weather, clutches should be given time to become fully meshed before power is applied.



• The holding or locking brake should never be relied on completely.

Danger of a machine running away on a hill is minimized when the rig is one of the makes equipped with ratchet locking pawls. When using such a machine on a hill, the crawlers should be on ratchet at all times. All ratchet bolts, keys or set screws should be inspected daily to make sure they haven't worked loose. It's never good practice to risk breaking some part of the propelling machinery for the sake of saving a little time. The operator should always be given time enough to rough out some sort of road for his machine rather than to expect it to clamber over rocks and other obstructions. Better yet, a bulldozer, if available, should be used to build a road for the excavator where the going is tough.

When working on a hard bottom, try to keep a clean spot for the treads so that the weight of the machine is well distributed. Otherwise, one or two treads may break as a result of the excessive weight put upon them. Here again, it's a good idea to prepare the floor ahead of the excavator with a bulldozer.

Cross at Right Angle

When it's necessary to cross obstructions such as railroad tracks, timber, steel, etc., gaps should be carefully bridged so that treads will not buckle between idle rollers. If this is not done rollers may catch on pads, ending either in pad breakage or a stalled engine. Such obstructions should be crossed at a right angle to the treads if possible. Otherwise the machine may sideslip or tip the pads enough to allow treads to come off sprockets, especially if worn or loose. No attempt to steer should be made while travelling over anything of this nature unless absolutely necessary.

When travelling a crane carrying a heavy load, the boom angle should be kept high enough to prevent reaching tipping position suddenly if the machine should pass over rough ground or the edge of a ramp or road. The load should be preferably lashed or guyed to the crane to prevent excessive

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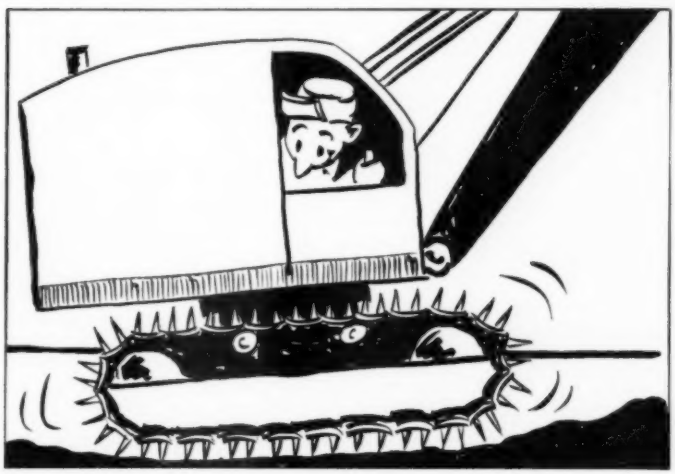


• Cleats improve traction in slippery going.

Building Australia

Eleven million cu. yd. of fill are going into the making of a new international airport at Mascot, Sydney, Australia. To provide such a site, a river is being diverted, a creek widened, swamps filled, a bay dredged, a new sewer viaduct built, a traffic bridge constructed and sand dunes levelled.

by H. Bowden Fletcher

AT a total cost of $20 million, Kingsford-Smith airport at Mascot, Sydney, New South Wales, Australia, is being expanded to bring it up to the safety and capacity standards requisite for an international airport. The principal work of the project, which requires a total of 11 million cu. yd. of fill, is the diversion of Cooks River to a new outlet on Botany Bay about a mile from its present mouth. Diversion is necessary because the river's natural route flows along the southern edge of the existing airport, blocking the only area available for expansion.

Before runways, taxiways, aprons and buildings can be started, work also involves filling in the old river bed, raising the level of new ground by nine feet, shifting half a million cu. yd. of sand dunes and filling in a low swamp area on the southern edge of the airport. A new traffic bridge over the diversion cut and a new sewer viaduct over Muddy Creek—which will be widened and incorporated into the new river course which it crosses—will also go up. More than eight million cu. yd. of sand will be pumped from the bed of Botany Bay to fulfill the requirements of the scheme, designed by engineers of the Australian Department of Civil Aviation. Diversion, excavation and fill work is scheduled for completion by the middle of 1951.

The diversion cut—to be 6,500 feet long—begins at the junction of Muddy Creek with Cooks River, about 1½ miles from the river's present mouth. The flow of the creek will be reversed when it becomes a part of the river course.

Begin Work in July, 1947

Work on the cut got underway in July, 1947, about 150 yards from Botany Bay after General Homes Drive was moved slightly closer to the shore of the bay which it skirts. Moving the drive temporarily was necessary because the foundations of a new traffic bridge are being sunk in line with the drive as it normally runs.

This concrete traffic bridge, being erected by the Department of Main Roads with its own crews, will be 568 feet long and 78 wide. It will be completed before the final opening is made into Botany Bay.

Sand—2½ million cu. yd. of it—is being removed from the 500-ft. wide

• Left: A Super "C" Tournapull leaves the beach along Botany Bay with a load of sand for Cooks River fill.

s International Airport

diversion cut to a depth of 18 feet; the bottom level is scheduled to be 12.5 feet R. L. on completion. Caterpillar D-7 dozers push surface sand into stockpiles from which a ¾-yd. Buckeye, a ¾-yd. Lima, a ¾-yd. Link-Belt, a ⅜-yd. Bucyrus-Erie and a ⅜-yd. Harman — all shovels — and Barber-Greene 512 bucket loaders with a capacity of 1½-cu. yd. per minute, lift it to trucks. The total number of trucks reached 44, all operated by their owner drivers on contract. These hauling units included 8.4-, 7- and 5-yd. GMC's, 6.7-, 6.2- and 5-yd. Chevrolets, 7-, 6.8, 5.7- and 5-yd. Fords, 5.7- and 5-yd. Internationals, 6.6-yd. Dodges, 5-yd. Bedfords and Diamond T's, and 3- to 5-yd. Macks, Federals and Ford-Thorntons. Trucks are contracted for as needed and the kind and number vary from day to day.

Hauling distance to the fill areas varies from ½ to 2 miles. About 8,700 cu. yd. are moved every week by an average of 18 trucks.

Build Temporary Bridge

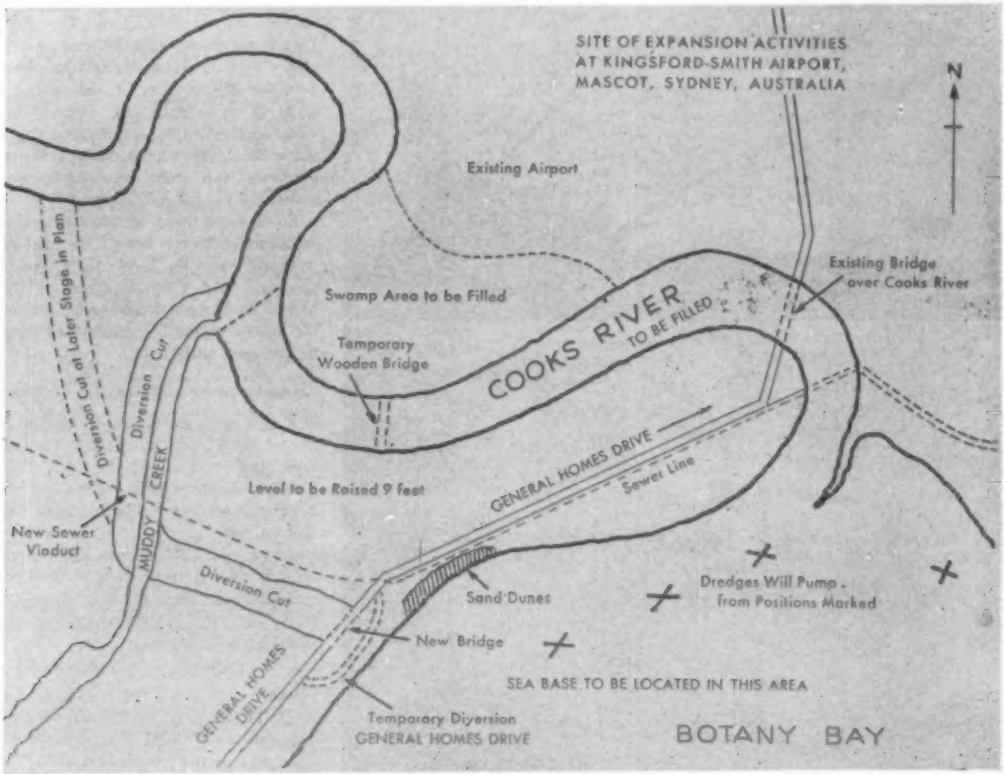
Three to five miles were cut off the haulage distance by the construction of a temporary 300-ft. wooden bridge over Cooks River about one-third of the distance between the junction at Muddy Creek and the existing mouth. The bridge framework is constructed from military pontoon landing bay sections of small steel box girder type surmounted with a timber deck and supported by wooden piles driven into a sand foundation.

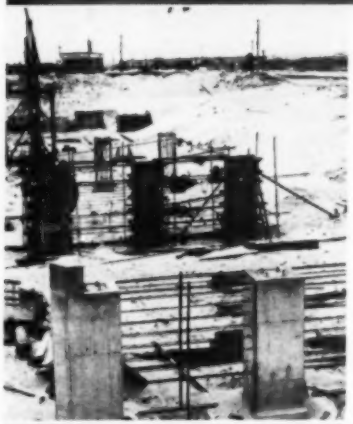
The bridge provides for two-way traffic allowing the bed on both banks of the river to be filled simultaneously. It also facilitates the filling of the airport swamp area and generally expedites the work of soil disposal. The only other available bridge is near the mouth of the existing Cooks River about 1¼ miles east of the cut. Its exclusive use would have brought the average haul distance to 3½ to 4½ miles.

Because the whole area is of an extremely sandy nature, temporary haul roads had to be laid to prevent sand bogging. Boiler ash, from the Bunnerong Power Station on Botany Bay six miles away is dumped by trucks and spread over the sand while wet to a depth of 12 inches by dozers and graded by a Caterpillar 12 road patrol for compaction to a depth of six inches. Compaction is effected by the traffic.

Groundwater from the diversion cut is used to fill a spray-fitted 800-gal. mobile tank mounted on a truck to continually water the surface. From 18,000 to 20,000 gallons are used daily.

Groundwater encountered at depths from one to four feet restricts the ex-





• Above: Here two 5-yd. Chevrolet Blitz trucks thunder across temporary wooden bridge carrying spoil material from diversion cut to fill areas. This bridge lopped about four miles off haulage distance and permitted fill work to be accomplished on both sides of Cooks River at same time.

• Left: These foundations will support bridge along General Homes Drive where it will cross "new" Cooks River.

• Below: This 2¼-yd. Bucyrus 14 steam dragline, here excavating in groundwater at river diversion cut, has been working for the Sydney Water Board for 30 years.

• Bottom: Much sandfill came from dunes along Botany Bay. Here a 12-yd. LP Tournapull loads sand aided by two Caterpillar dozers. Haul was through 8,800 feet of pure sand.

cavation to draglines once surface sand is removed. From two to seven are used at one time—a ⅝ yd. Harman powered with a Ronaldson and Tippet diesel engine, a ¾-yd. Koehring powered by a Chrysler industrial gas engine, a 2¼-yd. Bucyrus 14 steamer, a ⅝-yd. Buckeye, ¾-yd. Link-Belt, 1-yd. Lima and a ⅜-yd. Bucyrus-Erie. The draglines average about 1,800 cu. yd. daily.

To aid the draglines working in the groundwater, pumps have been installed at two open sumps to pump the water into a storm water drain which runs parallel to the sewer lines and empties into Muddy Creek. Two 6-in. Jaeger pumps working 15 hours a day and a 4-in. Jaeger working five, move 400,000 gallons out of the working areas in an average day, keeping the water level down to 18 feet below mean sea level. As the amount of excavation increases, two more 6-in. pumps and another 4-in. will be installed.

Earth from the diversion cuts is not sufficient to fill the bed of the existing river and raise the level of the area to the south. As a result, additional fill had to be brought from sand dunes on the shores of the bay almost adjacent to the new outlet.

Scrapers Move ½ Million Yd. of Sand

Half a million cu. yd. of sand were moved by 17-yd. and 12-yd. Tournapull scrapers assisted by Cats. The Tournapulls averaged 141 cu. yd. an hour, pulling their loads through 8,800 feet of pure sand and across a busy highway. Cats with dozers also pushed up stockpiles from which a ¾-Buckeye and a ⅝-yd. Harman—both shovels—loaded to trucks. This phase of the project was completed in July, 1948.

One of the major problems of the project is proper compaction of the old river bed. The main 8,000-ft. runway will be located along its center. To assure proper compaction, a 200-ton

Porter pneumatic compactor was imported from the United States for the job. The machine can be used in four weights, from 50 to 200 tons. The lighter weights are used in the early stages of the center fill. As the fill rises to the 14-ft. maximum, the weight is gradually increased.

Raise Ground Level Nine Feet

Because the river's natural course must be maintained until the new cut is ready to be opened into Botany Bay, no more earth is being dumped on the river bed. Fill is being dumped in the swamp area and between the sewer lines and river where the ground level is being raised nine feet.

In both these areas four Caterpillar D-7 and D-8 tractors with LeTourneau dozers spread the fill dumped by the trucks. Trucks deposit a new dump every 250 yards. As the fill reaches the required height, it is topped with ash by dump trucks and spread by Cat D-7 and D-8 dozers.

The area of the existing airport is mainly made-up ground. Its whole level will be raised to bring it above existing sewerage levels, to provide satisfactory drainage and overcome groundwater problems. Raising the level will also put the runways well above flood level.

When completed, the airport will have the shape of a cap peak with the high side along the southern boundary where the level will be 21 feet R.L., with a gradual fall to 4.5 feet R.L. to the west, north and east.

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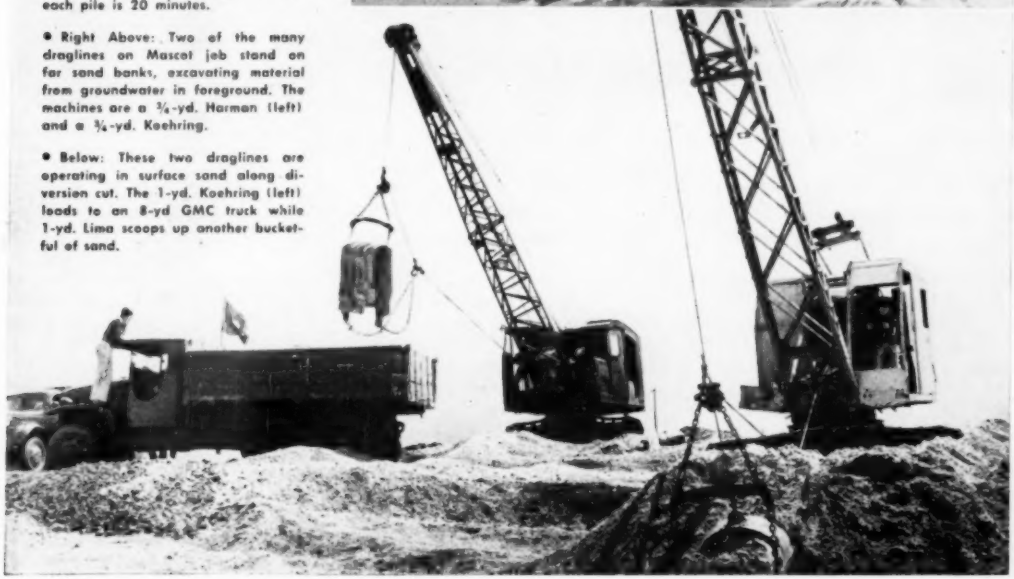


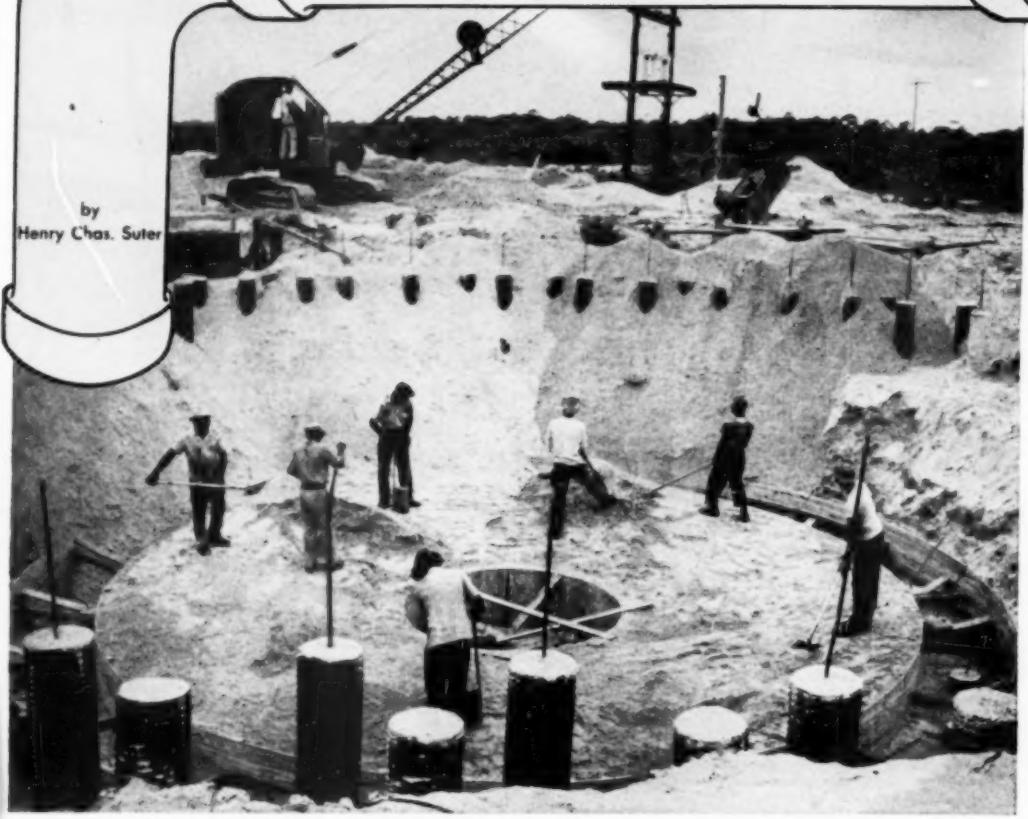
• **Right Top:** Concrete pile, 14x14 and 42 inches long, is one of seven for a bridge foundation pier. Piles are driven by steam drop hammer into sand inside concrete caisson, six feet deep and 10 ft. 6 in. in diameter. Caisson is then sealed with concrete. Average driving time for each pile is 20 minutes.

• **Right Above:** Two of the many draglines on Mascot job stand on far sand banks, excavating material from groundwater in foreground. The machines are a ¾-yd. Harman (left) and a ¾-yd. Koehring.

• **Below:** These two draglines are operating in surface sand along diversion cut. The 1-yd. Koehring (left) loads to an 8-yd GMC truck while 1-yd. Lima scoops up another bucketful of sand.

Daytona Beach Gets $

by
Henry Chas. Suter



Equipment belonging to eight contractors is almost ready to shove off after completing a new sewer network for a $4 million project in Daytona Beach, Fla. In 400 days construction men have moved 300,000 cu. yd. of earth and laid 100 miles of pipe for the gravity flow system.

• A ½-yd. Insley dragline backfills around base of disposal plant, part of new sewer system at Daytona Beach. Piles were driven by the Raymond Concrete Pile Co., New York, N. Y. Pictures in this article by Robert Hunter and Jack Jessee.

EVERYTHING from coquina rock to quicksand has come out of sewer trenches put down along 100 miles of new system for Daytona Beach, Fla. Eight contractors are putting the finishing touches to the $4,230,000 new utility network which will provide more adequate service for 4,000 homes and businesses. Of the total contract, $825,000 was slated for water mains, $400,000 for a new treatment plant, and the remainder for the new sanitary sewer system.

Under the head of consulting engineers, Russell and Axon, who hold the prime contract from the Daytona Beach City Commission, the contractors have moved 300,000 cu. yd. of sand, shell, muck, marl, coquina rock and quicksand. Various phases of the work are being done by Kahn and Jackson, Columbia, S. C.; Leo T. Barber, Moultrie, Ga., in association with Dixie Construction Co., Savannah, Ga.; Girvin and White, Jacksonville, Fla.; Frank Construction Co., Daytona Beach; Craggs Construction Co., Gainesville, Fla., and Quillian Cement Co., Holly Hill, Fla. These firms have had as many as 600 men a day working at one time on the project during the past year.

Gravity Flow System

The Daytona Beach system is designed for gravity flow of sewage. Beyond a certain minimum velocity, sufficient gravity flow cannot be maintained to insure against solids depositing in the pipe. Consequently, in the upper end of the system, 8-in. terra cotta pipe was laid with a fall of 4/10

4 Million Sewer

foot every 100 feet. In the lower reaches, where considerable flow is maintained at all times, lines are laid with a fall of 23/100 foot every 100.

This plan resulted in the absolute minimum of excavation necessary to safeguard against clogged sewers. Fifteen new pump and lift stations and ten old ones being reconditioned will take the sewage through to the treatment plant. At one of the pump stations, sewage will be lifted 17 feet. Nine hundred new manholes are also included in the present contract.

Soft sand was encountered nearly everywhere along the system which runs approximately 30 miles through the Beach Peninsula before reaching the mainland and Daytona Beach itself. Nearly every trench and excavation had to be shored up with heavy wood or metal sheeting to keep the walls from collapsing.

Special Mixture Seals Pipe Joints

Shrub roots have always played havoc with underground mains in the state. A bitumastic product—a mixture of cements, petroleum and naphtha—was used throughout most of the project to seal pipe joints. With its use, pipes will not separate or crack

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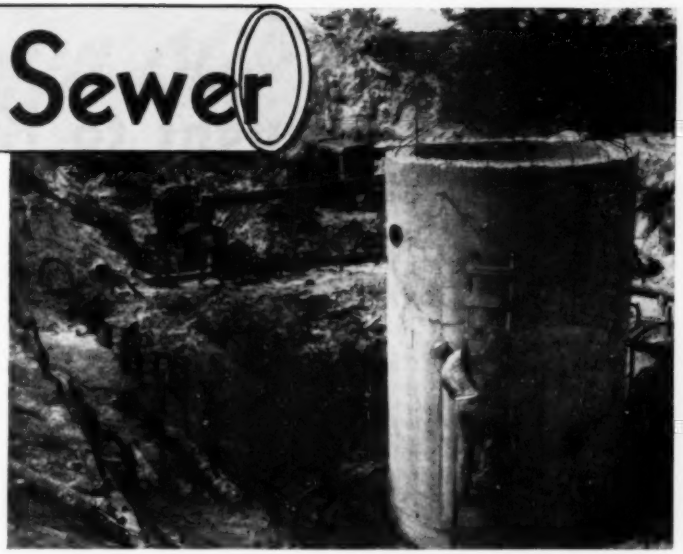


• Workman removes snap ties from concrete at a lift station. Original water level was at round outlet near top of pipe. Griffin and Complete wellpoint pumps (background) drained area.

• Right: A ¾-yd. Bucyrus-Erie 22-B dragshovel digs through heavy marl along one of the toughest parts of job. Marlow Mud Hog pump and Griffin wellpoints were used to drain excavation here.

• Left: Northwest 25 (foreground) with ¾-yd. Williams clamshell bucket excavates ditch through residential district. Michigan TMCT 16 truck crane follows, driving 5-in. steel piling to support wood sheeting necessary to hold up sides of sandy excavation.

• Above: Pile driving operation at Bethune Point, site of treatment plant.

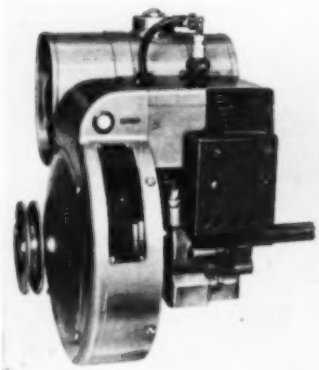
Equipment You Ought to Know About

Small Gasoline Engine

Manufacturer: Homelite Corp., Port Chester, N. Y.

Claims: A new air-cooled 4-hp Model 20 gasoline engine weighs only 19 pounds complete. It uses die-cast aluminum alloys for all major castings. It features 2-cycle design.

There are no exhaust valves. The one rotary intake valve is self seating and requires no adjustment. The engine speed is controlled by a built-in gover-



nor which is part of the rotary intake valve. Float-feed carburetor is furnished with or without throttle. Other important features include double-row ball bearings on crankshaft and connecting rod, needle bearing on wrist pin, and high-tension Wico magneto.

Designed for applications where light weight and compact size are important, this engine can be used either horizontally or vertically. It develops four hp at 4,000 rpm and three hp at 3,000 rpm. Overall dimensions are 9½ x 11½ x 13 inches.

Hydraulic Control For Conveyor

Manufacturer: Lake Shore Engineering Co., Iron Mountain, Mich.

Claims: Lightweight, portable, Tote-All belt conveyors are now available, if desired, with hydraulically-controlled belt and mounted on a new hydraulically-controlled Duo-Lift frame. The hydraulic system is powered with either an electric motor or gasoline engine. Hydraulic control of the belt speed permits reversing action of the belt and a range of speeds from 0 to 400 feet per minute.

The hydraulically-controlled Duo-Lift frame is mounted on four wheels with 4.00x8 pneumatic tires. Height of the low end of the conveyor can be adjusted from 20 to 48 inches and of the high end from 48 inches to 15 feet depending upon conveyor length. The Duo-lift frame is equipped with a tow bar so that the unit may be pulled by hand or vehicle.

Standard conveyors are available in lengths from 10 feet up in multiples of two feet and with belt widths of 8, 10 and 16 inches. Special lengths and widths can be manufactured to order.

Air Line Drain Valve

Manufacturer: Wilkerson Valve, Inc., 260 S. Dale Ct., Denver, Colo.

Claims: An automatic air line drain valve for compressed air application drains off water and oil that collects in the line, together with dirt, rust flakes, dust particles or other abrasive matter. Foreign matter is removed each time air is used, with a minimum loss of air through operation of the valve. The valve is recommended for such applications as impact wrenches, pneumatic drills, and equipment used by the mining and construction industries. The valve will handle from 0 up to 28 cfm at a 100-lb. pressure.

Tractor Pump Units

Manufacturer: Athey Products Corp., 5631 W. 65th St., Chicago, Ill.

Claims: Hydraulic pump units for operation of Forged-Trak dump trailers are now adaptable for use with Athey track-type earth and rock-moving trailers. The unit provides positive control of dumping operations, allowing Athey trailers to be side dumped, either when stationary or while tractor and trailer are moving. Controls for the hydraulic system are located near the tractor operator.

Arc Welder

Manufacturer: Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.

Claims: A new AC transformer arc welding machine known as the 200-A max. Wilson MCT is made for use by small shops and maintenance crews.

It has these features: Welding range divided into two ranges of current adjustment with stepless control throughout each range; capacitors supplied in the secondary circuit; built-in capacitors in the primary circuit; full-view scale; fully-insulated windings with heat-resistant spun-glass fibre; a primary "on and off" switch and a 10-ft. length of 3-conductor rubber-covered primary cable with lugs attached.

Any desired setting can be made by turning the crank handle on the top of the machine.

Crusher

Manufacturer: Hammermills, Inc., 1021 Big Bend Blvd., St. Louis, Mo.

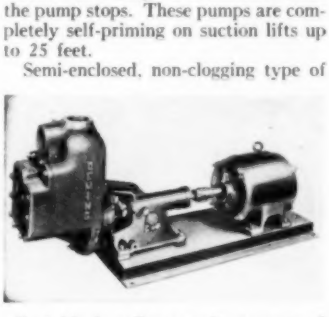
Claims: The new Bulldog non-clog, moving breaker plate Hammermills crush, shred or pulverize any reducible material regardless of moisture content or plasticity. The crusher will handle secondary or fine reduction, and is made in sizes to handle one to 1,000 tons an hour. Hammermills are designed and built to fit the particular jobs on which they are used.

Self-Priming Pumps

Manufacturer: The Deming Co., Salem, Ohio.

Claims: Six stationary models of self-priming pumps cover a range of capacities from 10 to 300 gpm, against heads up to 250 feet. One portable type (Model 3304) has a capacity range of 10 to 90 gpm against respective heads of 80 to 15 feet. Priming is fast and automatic. A positive non-siphoning feature assures automatic repriming regardless of the amount of backwash or suction line surge encountered when the pump stops. These pumps are completely self-priming on suction lifts up to 25 feet.

Semi-enclosed, non-clogging type of



adjustable impeller permits passage of usual size solids encountered in dewatering service. Pump casing is bolted to heavy-duty support head. Shaft op-

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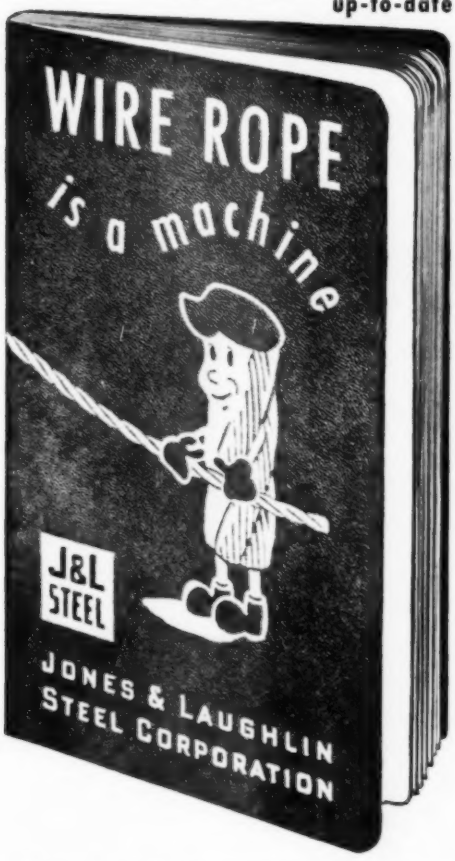

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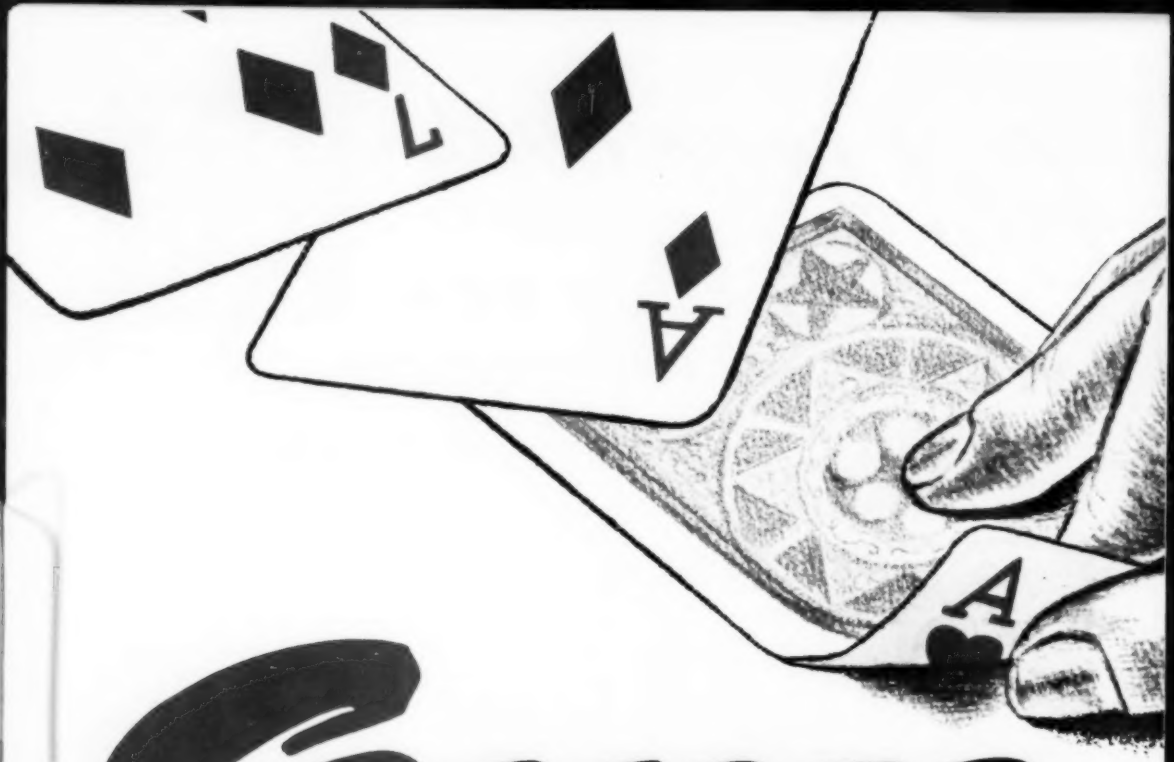

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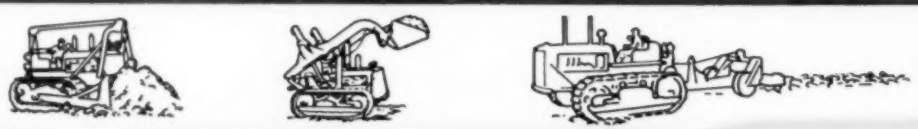

On Oklahoma hardpan which grousers can hardly penetrate, this International TD-18 diesel boils up a load in its matched 10-yard scraper. Without assistance—without difficulty—the International handles this tough loading at a speed that pays off in profitable work cycles. Tip: Turn your hard going into hard cash with International diesel crawlers.

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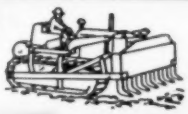
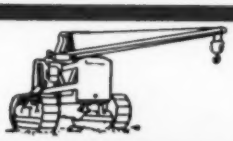




New Equipment

Continued from page 30

erates in two deep-grooved, oversized ball bearings.

Certain models (3312 and 3332) of these pumps are designed with casing and stuffing box separate from and bolted to support head. This type of construction makes it possible to adapt the pump for handling corrosive liquids as only the liquid end parts need be made of special alloys while the support head can be standard cast iron construction.

All stationary models are equipped with electric motors of proper characteristics. The portable type is equipped with a 1½-hp. 4-cycle, air-cooled gasoline engine having a high tension magneto.

Uses of the stationary types include general industrial pumping services, mine gathering service, irrigation or dewatering service and sump or bilge pumping. The portable type is used for a wide variety of drainage or water handling work.

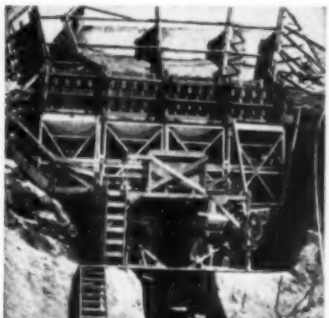
(Illustrated is Model 3312.)

Batch Plant

Manufacturer: Gar-Bro Mfg. Co., 2416 E. 16th St., Los Angeles, Calif.

Claims: The new Gar-Bro unit batch plant, a small portable batching plant, will charge a ½-yd. mixer. The plant consists of a standard center discharge hopper mounted in a steel frame high enough to carry a 24-cu. ft. or 3,000-lb. batcher underneath. From two to six of these units can be assembled to make up a portable batching plant of any number of compartments and of almost any capacity desired.

To permit skidding the batching plant about as a single unit on a job,



an 8-in. channel skid is provided to which the units can be bolted. The plant can be moved as a whole from one job to another, with any number of units bolted together. By removing a few bolts, it can be moved as separate, single bin units. The frame supporting the hopper can be knocked down for shipment. When disassembled and not being used as a batching plant, the hopper in each unit can be used as a concrete hopper. A crane is not necessary to assemble or move the plant.

Each hopper has a water level capacity of 81 cubic feet or four tons and a heaped capacity of 100 cubic feet or five tons. This capacity can be increased by 3-ft. sideboards or the contractor can enlarge the capacity by using wooden sideboards up to three feet high.

Midget Air Hoist

Manufacturer: Ingersoll-Rand Co., Phillipsburg, N. J.

Claims: A midget single-drum utility hoist, known as the Size BU, is recommended for a variety of hoisting, skidding and hauling jobs. The hoist will lift a 600-lb. load at 50 fpm and handle heavier loads with use of proper sheave blocks.

The reversible 4-cylinder radial piston-type air motor is equipped with safety-type throttle. A wide band-type brake gives positive holding power while the reversible motor permits lowering the load under power. For pulling out cable, a clutch lever permits the operator to readily disengage the drum.

Measuring 18½ x 10¾ x 11¾ inches the hoist weighs 72 pounds, less rope. It can be carried, installed, and used almost anywhere by one man.

For additional information, write Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., or any of its branch offices.

Surveying Micro-Altimeter

Manufacturer: American Paulin System, Los Angeles, Calif.

Claims: The Micro-Altimeter is graduated in intervals of one foot over a range of 6,000 feet. It is accurate to one foot and sensitive to altitude changes in inches. This portable instrument weighs 4½ pounds. Claims are that surveys can be run in one-tenth the time consumed in ordinary surveys with greater accuracy and dependability.

The M-1 is the first of a new Micro series and will shortly be supplemented by the M-5 with a range of 15,000 feet graduated in intervals of five feet and the Model MM-1 with a range of 5,000 meters graduated in intervals of one meter.

All models have a leather carrying case with hand and shoulder straps. Included with each instrument is a magnifier, thermometer and full operational procedure.

Sign Service

Manufacturer: Porcelain Enamel Finishers, Dept. J-2, 3221 W. 30th St., Chicago, Ill.

Claims: A sign service provides individualized signs. Finished in porcelain enamel, the signs can be used for outdoor service where resistance to all types of weather and corrosive atmosphere is necessary. Enamel won't fade or wear off, and the signs can be cleaned with water or any organic solvent.

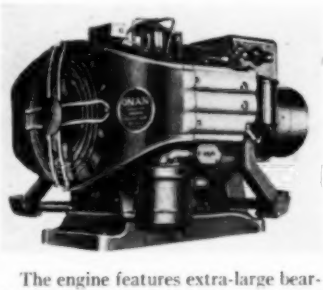
These signs are available in any size or shape and in any quantity. The company will finish signs already fabricated or will produce them to any specification, designing signs when requested.

The service is recommended for signs on streets and roads and for contractors and businesses who employ identifying, safety or instructional signs.

Diesel Electric Plant

Manufacturer: D. W. Onan & Sons, Inc., Minneapolis, Minn.

Claims: A 5,000-watt AC Model 5DRP diesel electric plant incorporates a prime mover—an opposed-two-cylinder, air-cooled diesel engine. It requires no bolting down or special base. Integral shock mountings make it possible to operate this unit right on the floor. Its dimensions are 38¾ x 30¼ x 26⅛ inches. Air-cooling helps to keep its weight down to approximately 725 pounds, less batteries.



The engine features extra-large bearing surfaces, forced pressure lubrication, compression starting, an oversized (6-qt.) oil sump, two large oil bath air cleaners, and a primary and a secondary fuel filter. Two intake air manifolds have built-in electric heaters operating from the starting batteries. All 5DRP models are electrically cranked from a start-stop switch control located on the plant. Remote-control stations can be installed within 250 feet of the unit.

The 5KW generator is directly and solidly connected to the engine crankshaft. A 55-gal. or 110-gal. underground fuel tank and fittings, 3-conductor start-stop wire and 5/16-in. copper

tubing fuel lines are optional accessories. Adaptable to portable applications, the 5DRP is available in 60- or 50-cycle and in all standard voltages. It provides electric power for construction projects, and other applications where low-cost primary electric power is especially important.

Hydraulic Crane Scale

Manufacturer: A. H. Emery Co., Stamford, Conn.

Claims: Three models of new crane scales are available: The EU-20-T in any one of eight load capacities, from 0-100 to 0-10,000 pounds; EU-40-T, 0-12,000, 0-15,000 and 0-20,000 pounds; and EU-60-T, 0-25,000 and 0-30,000 pounds.

The crane scale is designed primarily for measurement of loads as they are handled by a crane, although it is adaptable for other force- and/or load-measuring applications. The basic feature is the EU Emery hydraulic cell which converts force into corresponding fluid pressure which is connected to a pressure indicator, calibrated to read in pounds of load on the scale. The complete scale measures from approximately 22 to 36 inches in overall height, depending on the model.

Three dial sizes are available: 8½, 12, and 16 inches in diameter. All dials have an adjuster for setting the pointer to zero (eliminating the need for a tare reading). A red maximum pointer can also be furnished upon request. Accuracy is guaranteed within 1% of reading, or .2% of capacity. Hook and eyebolt are swivel mounted.

Prices of the scales range from $882 to $1,385, f.o.b. Stamford, shipment within 60 days from receipt of order.

Heavy-Duty Engine

Manufacturer: Hercules Motor Corp., Canton, Ohio.

Claims: The JX4 series of 4-cylinder heavy-duty gasoline engines consist of Models JX4E with 3½-in. bore x 4¼-in. stroke and 164-cu. in. displacement; JX4C with 3¾-in. bore x 4¼-in. stroke and 188-cu. in. displacement; and JX4D with 4-in. bore x 4¼-in. stroke and 214-cu. in. displacement. These engines are for general purpose power application.

The JX4 series is equipped with five main bearings and the crankshaft is counterbalanced. The crankshaft is also Tocco hardened to permit the use of bearing metals of relatively hard and long service qualities. A positive oil seal at front and rear of the crankshaft protects against oil escaping at these points.

The alloy aluminum pistons are of the heavy-duty type, each equipped with four rings, all above the piston pin. Compression rings are Ferrox-filled and oil rings are of double-duty type. The piston pin is securely clamped in the upper end of the connecting rod and locked to prevent contact with the cylinder walls.

Oversized oil pump of the gear type with adjustable pressure regulator provides pressure lubrication to all main and rod bearings, idler bearing and oil pump drive gear.

Air Tools

Manufacturer: Worthington Pump and Machinery Corp., Harrison, N. J.

Claims: Three new Blue Brute air tools, a clay digger, a trench digger and a breaker, are available for the construction equipment field. The tools feature 4-bolt handles, built-in lubricators, replaceable bronze cylinder bushings, replaceable chuck bushings and interchangeable handles. A streamlined latch-type retainer enables trimming and breaking in close quarters without damaging the retainer fulcrum pin because there are no side projections.

Motor Grader

Manufacturer: Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Claims: The new 34.7-hp. Model D motor grader weighs 8,500 pounds. It has big-grader features like tandem rear-wheel drive, tubular frame design, and rear-mounted engine-transmission construction. It is made for light construction work, and is particularly recommended for use by governmental bodies, contractors, mine operators, airports and railroads.

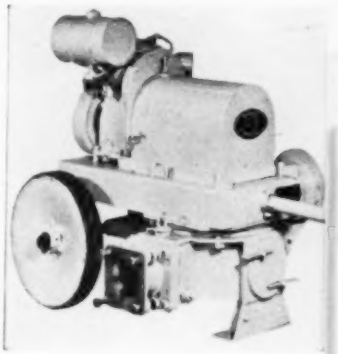
The D has short turning radius, and can attain speeds up to 18.61 mph. Another design incorporated in the new D is the "Roll-Away" moldboard—it rolls the dirt away from the blade instead of packing it down. An abundant throat clearance from the moldboard to the circle bottom enables the grader to accommodate capacity loads that pass through the arched front without disturbing the rolling action of the load.

Hydraulic lift, side shift, and seven blade pitch positions facilitate handling. A compact transmission which uses the transmission gears to bridge the vertical distance from engine to drive axle provides power for four working speeds ranging from 2.40 mph to 18.61 mph forward, and 2.87 mph reverse. The grader carries an 18-gal. fuel tank.

Diaphragm Pump

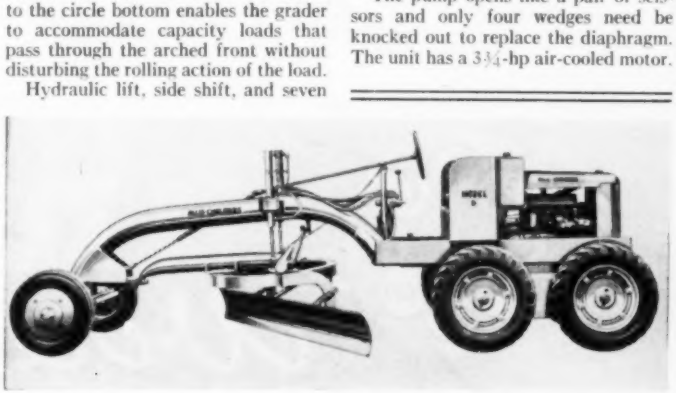
Manufacturer: Chain Belt Co., Milwaukee, Wis.

Claims: The Rex 4-in. closed diaphragm pump has a capacity rated at 6,000 gph with a 10-ft. suction lift. This pump is of all welded steel construction using Yolloy steel for rust and abrasion resistance and light weight. The unit weighs only 440 pounds. No castings are used.



The diaphragm pump features all enclosed gear case with helicoid-type cut gears mounted on ball bearings running in oil. The crank arm of the pump has needle bearings and a shear pin. This shear pin is a safety measure protecting the gears and power unit in case of abnormal overloads or severe clogging.

The pump opens like a pair of scissors and only four wedges need be knocked out to replace the diaphragm. The unit has a 3¾-hp air-cooled motor.



When You Order Ropes for Scrapers

TAILORED TO STAY WITH ANY WHEELED SCRAPER LONGER IN TOUGH GOING

Take a Look at These Tuffy Scraper Rope Field Performance Records

Operator of 4 wheel scrapers changed two of them over to Tuffys. Chief mechanic's record showed drum crushing made it necessary to cut a competitive rope 11 times while Tuffy needed to be cut only 4 times. Tuffy gave 33⅓% more service and became standard equipment on all rigs.

Tuffy Scraper Ropes are proving to be really 'Tuffy' up in this part of the country (Nebraska). They wear out instead of breaking up. Ship two more 300 ft. reels of Tuffy.

On April 1st, 1948, I placed two rolls of Union Rope on our scraper No. 3, and at the same time placed two rolls of another make of rope on scraper No. 1. Both worked about the same number of hours and performed about the same amount of work during the past working season. Scraper No. 1 had to be rewired whereas scraper No. 3 has about ⅔ roll of the new type (Tuffy) rope still on it.

UNION - WIRE ROPE CORP

union Wire Rope

Specify Tuffy Trade Mark Scraper Rope

DESIGNED TO PICK UP AND LAY DOWN MORE LOADS OF "PAY DIRT"

Harnessing the power of a traction unit to the mechanical operation of a towed wheel scraper subjects wire rope to varied and severe abuses. For more than ten years, Union Wire Rope Engineers have made exhaustive field studies leading to the design of the new Tuffy rope construction for wheel scrapers tough enough to stand up longer under:

- **Greater drum crushing abuse.**
- **Sharper bends over smaller sheaves.**
- **Angle pulls through swivel mounted sheaves.**
- **Crawling on flanges of guide rolls and edges of sheave housing.**
- **Multiplied impact shock of load on slack lines.**

Changeovers to Tuffy Scraper Rope by operators of all makes of wheel scrapers have steadily mounted. Use on one scraper leads to changing over the whole fleet. This, and the regularity of repeat orders, is strong testimony of the extra yardage handling ability of Tuffy Scraper Rope.

For Longer Runs and Lower Cost Mount Tuffy Reels on Your Scrapers

Tuffy scraper rope is wound on special built reels with countersunk bolt ends. This eliminates hazards to the safety of operators. Reels are readily mounted on reel carriers. They hold up to 600 ft. of ½-inch, 500 ft. of 9/16-inch, with the Tuffy rope wrapped in waterproofing. No complicated specifications are necessary. In ordering from your Union Wire Rope distributor, simply say—

Tuffy Scraper Rope

_____ Reels _____ Feet
How Many Length

_____ inch in diameter

That is all it takes to bring you new scraper rope yardage records. Tuffy is Union-formed (pre-formed). It has the flexibility to withstand more bending over small sheaves, yet the stiffness to resist looping and kinking when slack; and on the crown of each strand, less length of wire is exposed to be torn or crushed out of shape. Specify Tuffy by the full reel—save re-threading time.

UNION WIRE ROPE CORPORATION

2142 Manchester Ave. Kansas City, Mo.

☐ Send New Folder on Tuffy Scraper Rope.

For Tuffy Scraper Rope—See Your Union Wire Rope Distributor (Listed in Yellow Section of Your Phone Directory) and/or send this coupon.

Firm Name_____

Address_____

City_____ Zone_____

State_____

Ideas on the Job

Remodel Conveyor To Meet Clearance Laws

The La Mesa, Lemon Grove and Spring Valley Irrigation District, La Mesa, Calif., remodeled the conveyor units on its two Buckeye trenchers to comply with state clearance laws. After the change the overall width of the machines was not more than eight feet, the limit for highway travel.

Changing the width of both a Model 11 and a Model 12 special machine was accomplished by first cutting the entire conveyor framework between the two outermost idlers. Plates were welded on each side of the frame to both the cut-off and larger section. Plates were combined with a shaft to produce a hinge and the large part of the frame was cut out sufficiently to permit the outer section to fold over it when in a raised position.

Aside from meeting California clearance requirements, an extra advantage was found by service mechanics who can now relace the belt where previously they had to discard it for a new one. Because of the leverage created when the extended section is lowered, the belt stretches into position.

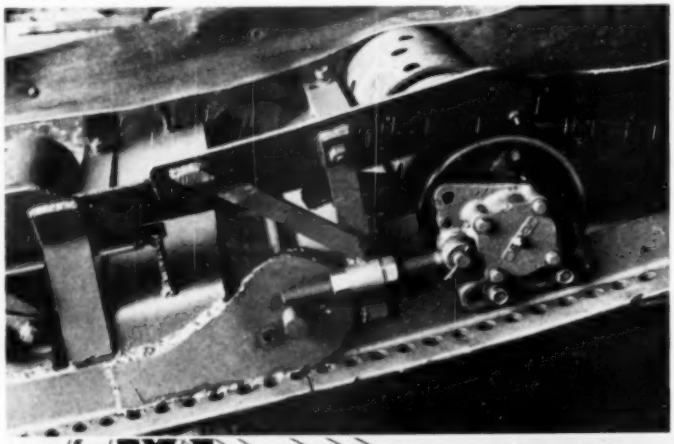
Dam Fill Gets Water Via Portable Pumping Unit

A problem which is especially bothersome to earthen dam constructors in the drier sections of the country has been successfully solved by engineers building the San Angelo Dam, near San Angelo, Tex. Here a novel method for adding water to fill material to provide the proper density required by government specifications has been worked out. Instead of laboriously trucking water from the nearest source to borrow pits on the excavation side, the San Angelo project employs a portable pumping system like that used in farm irrigation.

Construction at the dam is divided into three stages, two of which have been completed. The third and final stage involves over 11 million yd. of earthmoving and is being handled by a combine under the name of Concho Constructors. Contract completion is scheduled for 1,200 working days.

Excavation Area Very Dry

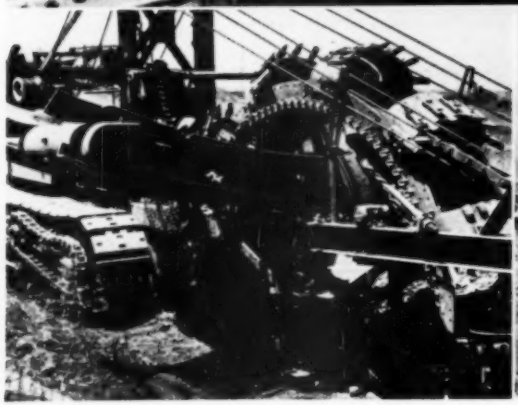
The soil at the excavation area is so dry that 40 gallons of water must be added to each cu. yd. to bring it to the density of 95% specified by the Corps of Engineers. Caliche, a porous but adhesive soil found in the area, is used principally for the impervious fill. The problem of adding water to soil for construction work is by no means new

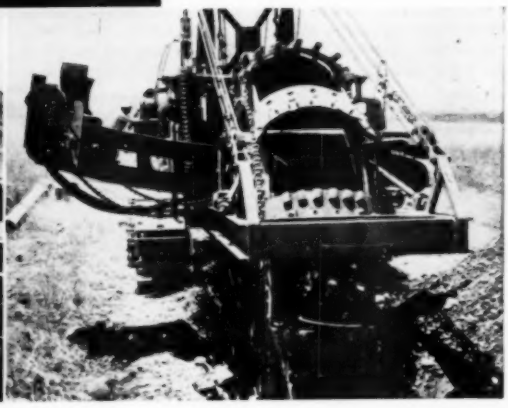


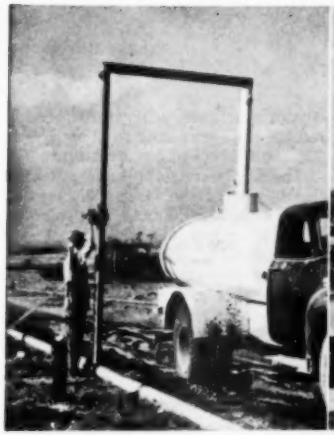
• Left: This closeup shows how the La Mesa, Lemon Grove and Spring Valley Irrigation District, La Mesa, Calif., remodeled its trenchers to make them comply with state clearance laws. Shown is the finished job—the conveyor framework was cut between the last two idlers, plates were welded to each side to hold a shaft which connected them. In this way the small outer section could be folded into the main frame which was widened.

• Below Left: The conveyor extended to its working position on the Buckeye ditcher.

• Below Right: The conveyor folded for travel along California highways. The remodeling has not impaired the efficiency of the conveyor and no special problems have developed because of the change.







• Above: A big convenience and time saver for Concho Constructors, holders of the contract on the San Angelo Dam, near San Angelo, Tex., are "filling stations" for haul road sprinkler wagons. The system eliminates long hauls to the river and 1,500-gal. tanks can be filled in three minutes.

• Above: Specifications call for 40 gallons of water for every yd. of fill. Water is pumped by a portable pumping unit at river's edge and carried through 17,600 feet of discharge line with help of two boosters. At one discharge point, Lima dragline dumps load of caliche into hauling wagon.

but project engineers believe their method of solving it is the first of its kind.

Stewart & Stevenson Services, Houston, in cooperation with Armstrong Tractor Co., Austin, Tex., installed the water pumping system which is an adaptation of a portable overhead irrigation system.

Portable Pumping Unit

A portable pumping unit, consisting of a 3-cylinder 3031C diesel engine directly connected with a Gardner-Denver 5-D centrifugal pump and mounted on a trailer, takes water from the North Concho and sends it through 5-in. aluminum pipe in 20-ft. sections to any excavation point on the project. Two booster stations, made up of identical pumping units with 330-gal. fuel tanks mounted on skids are situated along the line to give the system its extreme range. The line can be lengthened or shortened as necessary, merely by adding or removing the 20-ft. sections.

Water is lifted an average of nine feet from the river surface and in the first few days of operation was being pumped to the project borrow pits through 17,600 feet of discharge line. Maximum elevation in the line above river level is 110 feet with the system delivering at a flow of 650 gpm. As the line is shortened—it is at its longest right now—the flow will increase.

20,000 Yd. of Fill Daily

Estimated average length of line for the entire project is expected to be approximately 11,600 feet. At this distance the flow will step up to 850 gpm and provide the right amount of water to keep the fill on the necessary 20,000 yd. per day basis.

Another interesting and important part the pipe line plays in the project is in the loading of watering trucks. At two points along the line, standpipes have been placed. Watering trucks can pull under these pipes and refill in a very short time. Enough water flows through the standpipes to fill a 1,500-gallon tank in three minutes.

Wire Rope Lubrication

Although difficult to obtain, effective wire rope lubrication in the field is possible. A good process to follow is that of passing the rope through a bath of lubricant heated to at least 135°F. The rope should remain in this heated bath for a time sufficient for complete saturation.

High viscosity lubricants which are resistant to the action of water should be used to minimize corrosion and prolong rope life. They have a high degree of adhesiveness for metal surfaces and are sufficiently mobile to insure their being spread into the lubricating film between sliding surfaces working under heavy pressures. Such lubricants will not separate under high temperature conditions. They are also best when applied hot.

Light lubricating oils which might be applied cold, will not remain between the wires or strands and therefore are not recommended. Applying a lubricant to the outside of a rope with a brush or swab does not achieve the necessary penetration; instead, it results in accumulating excessive abrasives which tend to increase wear.

Automatic Hardfacing

With the development of continuous high-alloy wire, the field of automatic welding has been enlarged to include hardfacing. This method has now also been applied to heavy construction equipment.

Automatic application is readily adapted to practically any equipment or parts on which hardfacing may be laid in a series of continuous stringer beads. This may be on a cylindrical piece where beads are placed circumferentially or on flat work where the deposit may be made as a series of straight stringer beads.

Maintenance of Heavy Equipment

A growing number of privately-owned job shops have set up automatic equipment for maintenance of construction equipment. There are now some 20 job shops equipped to handle the rebuilding of worn heavy equipment in the western states alone. Maintenance shops of large organizations such as heavy contractors, mines and the like can profitably install automatic heads to take care of their equipment.

The rebuilding of tractor rollers, manually welded for many years, was the first job shop work performed with automatic hardfacing. Rollers are of such size and shape that they are handled easily for automatic rebuilding. Tractor rollers are rebuilt to full size for usually one-half the cost of replacement parts. The life of rebuilt rollers has been two to four times the life of factory-replacement parts. Naturally the alloy metal used for reclaiming

Continued on page 54

News from the Field

Interstate Roads Need $11¼ Billion

Based on the construction costs of 1948, $11¼ billion are needed to correct the deficiencies that exist in the routes of the National Interstate System which serves 20% of the nation's traffic. This estimate was reported in a survey made by the PRA in cooperation with the states and submitted to Congress by the President.

The Interstate System, as designated by the states and the PRA and approved by the Federal Works Administrator, at present comprises 37,800 miles of the most heavily traveled routes, both rural and urban, in the Federal Aid primary system. Approximately 2,200 miles of the 40,000-mile interstate system authorized by the Federal Aid Highway Act of 1944 have been reserved for future additions to the system, principally in urban areas. The network of highways in the system serves 182 of the 199 cities of 50,000 or more population as well as many smaller communities.

Although the system includes only 1% of the country's total mileage of roads and streets, its rural sections serve 20% of the traffic carried on rural roads and more than 10% of traffic moving over city streets.

The report stated that the system is most deficient in sight distances, in the width of pavements, shoulders, and bridges. All but 1,900 miles of 31,831 miles in the rural sections of the system require improvement to bring these routes up to standards recommended for existing volumes of traffic. Of the 5,969 miles of roads and streets in urban area, all but 398 require some improvement. Of the 10,050 bridges in the rural sections, only 483 are adequate.

Proposed relocations to correct deficiencies would shorten rural sections of the system by 384 miles and urban sections by 257 miles, a total reduction of 641 miles from the present length of 37,800 miles. Approximately 52% of the high-type pavements, 85% of the intermediate types and 93% of the low-type surfaces will require replacement in the next 10 years.

The estimated cost of proposed improvements is broken down into rural and urban requirements at almost $6 billion and more than $5¼ billion respectively. The report recommended very strongly that corrections be made within 20 years on every mile now considered deficient. A capital investment of $500 million a year will be required to take care of the faults now in the system.

16th Engineering Exhibit In London This Month

All of the Olympia premises in London, England, have been reserved for the 16th Engineering and Marine Exhibition which will be held from Aug. 25 to Sept. 10. The 15th exhibition was held there and because of the success of that meeting it was decided to reserve the entire area to allow 150 to 200 more firms to participate.

The Engineering and Marine Exhibition is one of the largest displays of engineering manufactures in the world. In 1947, when 480 firms displayed their products, over 140,000 visitors from every continent attended the exposition. The event has been held bienially since 1906, except for the interruptions caused by the two World Wars.

Jess Larson Named Head of GSA

Jess Larson, Federal Works Administrator since June 6, has been named to head the new Federal agency, General Services Administration. This new agency brings together the property and supply building construction and management, records management, and certain public works functions of the Federal Government.

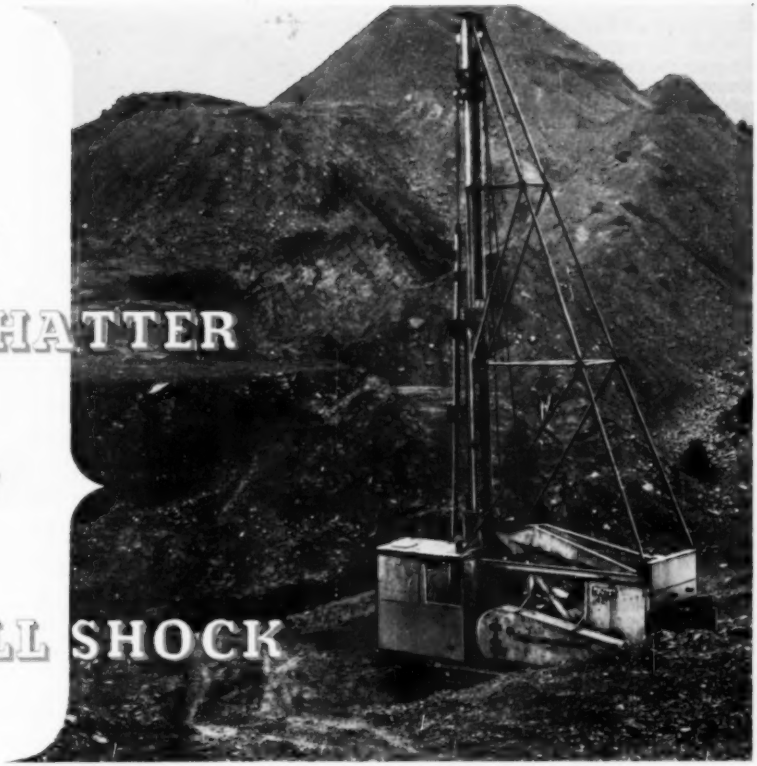
Consolidated in GSA are all functions of the Federal Works Agency, including the Public Buildings Administration, the Bureau of Community Facilities, and the Public Roads Administration; the Bureau of Federal Supply and the Office of Contract Settlement, from the Treasury Department; the National Archives Establishment; and the War Assets Administration. The name of PRA has been

• At Vieques Island in the Caribbean two Bay City cranes and an International-mounted Bucyrus-Erie TD-18 Bullgrader move off an LSM 207 during recent Seabee maneuvers. Other heavy excavating machinery is on the LST 1041 in the distance. Photo by Authenticated News.

PLENTY ROCK SHATTER

BUT

NO DRILL SHOCK



BUCYRUS-ERIE blast hole drills smash into rock with a sharp shattering impact — yet without harmful shock to the machine itself. Here's why. Every Bucyrus-Erie drill is equipped with a derrick-head shock absorber which not only minimizes vibrations and shocks but, even more important, helps produce sharp, powerful drilling blows for speedy penetration. The shock absorber is formed by a series of rubber rings which compress with the downward drilling stroke, permitting the tools to "reach out". The instant the bit strikes, the discs expand and snap the tools away from the hole bottom, giving the drilling blow the sharpness that means most effective penetration. The result is steady high footage at low per-foot cost.

Electric-welded frame and derrick are rigidly braced to resist stress. There are no rivets to shake loose. Machinery is tough, simple, and arranged for easy accessibility. Bucyrus-Erie blast hole drills are the product of over 80 years of drill building experience. They're output leaders on mine and quarry jobs throughout the country.

37849C

BUCYRUS ERIE

SOUTH MILWAUKEE, WIS.

Step up your drilling pace with one of these hard-hitting Bucyrus-Erie blast hole drills.

22-T	27-T	29-T	42-T
5⅜" to 6¾" holes	6" to 6¾" holes	6" to 9" holes	9" to 12" holes

Gasoline or electric power is available for all machines — diesel for all except the 22-T.

changed to the Bureau of Public Roads.

While the authority and responsibility for the various property, building construction, records management, and public works functions are transferred to the administrator, these functions will continue for the present to be carried out by the constituents brought into GSA. In the field of supply the aim of the GSA will be to bring about maximum use and minimum purchases of Federal property and non-personal services. This will be accomplished by establishing uniform policies and methods for procurement, utilization and related activities.

Through the Bureau of Federal Supply the GSA will continue to maintain centralized purchasing where it is most advantageous to the Government.

By administering a system of inventory levels of property held by the various executive agencies, GSA aims to insure maximum utilization, transfer of excess property from an agency that no longer needs it to one that does, and disposal of property which becomes surplus to the needs of the entire Government.

Purchases are now made by the Washington headquarters of the Bureau of Federal Supply and also by various supply centers which are located in New York, Boston, Cleveland, Chicago, Kansas City, Atlanta, Fort Worth, Denver, San Francisco, Long Beach and Seattle, as well as by individual departments for the needs of all Government agencies.

The PRA, previously the Bureau of Public Roads in the Department of Agriculture, was created in 1893 as the Office of Road Inquiry. During the past ten years the PRA has aided in the construction of 98,075 miles of all types of Federal highways at an estimated cost of $2,985 million of which the Federal contribution was $1,757 million. The Federal Aid Highway Act of 1948 authorizes Federal Aid funds of $450 million a year for the next two fiscal years.

• Larry Cook (left), executive vice-president of the Ohio Reclamation Association, is shown receiving the President's Award from George Usher, president of the Western Reserve Chapter of Friends of the Land, presented for the association's "outstanding contribution to the advancement of public knowledge concerning the vital conservation problem." The Ohio group is engaged in restoring to productive use the surface areas of over 70 member strip mine operators in Ohio. Through their efforts, more than 1½ million seedlings were set out this spring alone. For the past three years the group has mailed trees for Arbor Day planting to each of the schools in the 29 counties comprising the coal area of Ohio. The Friends of the Land is a society of people from all walks of life devoted to a better land use and the ideals of conservation.

Gas Taxes Net $1 Billion

According to figures compiled by the PRA, motor vehicle operators paid a total of $1,342,973,000 in state taxes on 30,646,486,000 gallons of motor fuel consumed in 1948. This was an increase of 2,239,428,000 gallons or about 8% over the gallonage consumed in 1947. The average gasoline tax per gallon in all states was 4.35 cents in 1948 compared with an average of 4.25 in 1947. State tax rates range from two cents per gallon in Missouri to nine in Louisiana.

Col. Davis Takes Over In Galveston District

Lt. Col. Ellsworth I. Davis is the new district engineer at Galveston, Tex. He has been assistant district engineer at Sacramento, Calif., since Aug., 1948. His predecessor at Galveston, Col. B. L. Robinson, has been

• Against the background of Consolidated Rock Product Company's sand and granite quarry, at Irwindale, Calif., a stacker conveyor—the end of a 4,717-ft. Goodrich belt—empties aggregate into a surge pile. Material comes from a newly-developed pit about ½ mile away which was opened when the deposit in this picture dwindled. The belt was installed to carry material to the old pit where the processing mill is located. Reclaiming tunnel is shown in lower foreground and leads to the plant mill.

made division engineer of the South Atlantic division at Atlanta, Ga.

The new Galveston district engineer has been with the Corps of Engineers since his graduation from West Point in 1932. He has served as assistant district engineer at New Orleans, La., and at Washington, D. C. During the past war he was awarded the Legion of Merit for his service in the development of air borne aviation construction equipment and other military items.

Col. Robinson came to Galveston in Aug., 1947, after seven years of continuous overseas service in the Pacific area. While he was the head of the Galveston district, the Corps began the construction of the Lavon, Grapevine and Garza-Little Elm Dams near Dallas and the Benbrook project near Fort Worth. Work continued on the $41 million Whitney Dam near Whitney on the Brazos River (See *Excavating Engineer*, July, 1948, "Saddling the Brazos," p. 28); the San Angelo Dam near San Angelo and Dam "B" near Jasper.

Completed under Col. Robinson were the Addicks and Barker flood control projects near Houston (See *Excavating Engineer*, Feb., 1949, "Houston Gets Flood Protection," p. 24); Hords Creek Reservoir near Coleman; the Gulf Intracoastal Waterway from Corpus Christi to Brownsville, and several navigation projects. Lt. Col. Davis will continue the $50 million construction program slated for the Galveston district.

Chilean Copper Mine Makes Way for New Plant

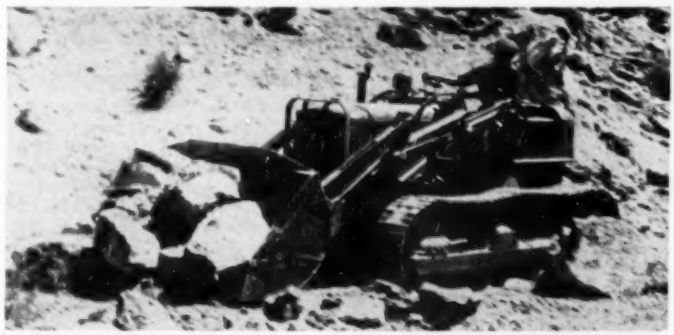
Nine thousand feet above the barren Chilean pampas and 90 miles from the Pacific Coast, the world's largest copper deposit is undergoing a $130 million conversion project. Headquarters of the undertaking is Chuquicamata, a remote, sun-baked mining town, 120 miles northeast of Antofagasta, Chile's principal northern seaport.

Of Chuquicamata's 25,000 people, 8,500 work for the Chile Exploration Co., subsidiary of Anaconda Copper Co., owners of the mine. They have excavated more earth than the men who dug the Panama Canal. Working in an ore body 9,000 by 3,000 feet, they have fashioned a terraced open pit mine which, since 1915, has yielded nearly five million tons of valuable rich ore. As was noted in an *Excavating Engineer* article (Aug., 1939, "Chuquicamata Copper," p. 439), the deposit had been drilled to a depth of 1,900 feet and some holes were still in ore.

But now the geology of the area is dictating a change in the present mining process. The upper oxide ore has given way in spots to a mixed oxide-sulphide ore. The big job right now is building a new plant that will facilitate the direct extraction of copper from sulphide ore. Preliminary clearing and excavation were started last October.

Fourteen Allis-Chalmers HD-19 and three HD-7 dozers plus several HD-10 and AD motor graders are now pushing initial excavation and construction work on a new reservoir and workers' housing units. Communication lines, water mains and levelling for the building site at 10,000 feet elevation is proceeding according to schedule. Construction of the huge complicated processing plant will begin when all preliminary work is completed. The plant is expected to be in operation by 1952.

At present, blasted ore is shoveled into cars, dumped into crushers, leached with weak sulphuric acid and submitted



• Right: An Allis-Chalmers HD-5 with a front-end loader clears debris from the path of a water pipeline for the workers' housing area at the Chuquicamata copper mine in Chile. Preliminary excavation and levelling is proceeding at 10,000 feet above sea level.

• Below: The working area of open-pit Chuquicamata copper mine is 9,000 by 3,000 feet. Nearly five million tons of high grade copper have been taken out since 1915. A new plant will be built soon to process the mixed oxide sulphide ore under the upper oxide layers.

to the fundamental electrolytic process which deposits metallic copper on thin sheets. The changeover is necessary because sulphuric ore cannot be leached with sulphuric acid. In the new plant sulphur will be removed with air as sulphuric dioxide and the unwanted iron with silicates as slag. The process is known as flotation and the end product will be molten "blister" copper.

• A 2½-yd. Bucyrus-Erie 54-B shovel is "knee-deep" in river water at Punxsutawney, Pa., loading river bottom mud to Caterpillar DW-10 tractors with hauling units. Ruth Construction Co. is doing the channel deepening job.

Use Tower Excavators At Coal Strip Mines

The Truax-Traer Coal Co. has been using a tower excavator to strip overburden at its coal strip mine at Velva, N. Dak., since 1943 when the overburden became too deep for normal operations with the draglines and shovels then in use. The mine has been worked by stripping since 1927.

Overburden is mostly a heavy black clay, sometimes sandy, with some entirely sand—no blasting is necessary. During one season, overburden averaged 66 feet deep in one of the pits although some parts were only 45 feet deep. The coal bed averages 14 feet in thickness.

The tower excavator was brought to the Velva stripping operations from Tennessee where it had been working on levees. A Bucyrus-Erie machine, it was built originally for digging fill from shallow borrow pits, transporting it to the embankment and forming the levee on whatever slope was specified for the job.

Units of Tower Excavator

Basically the tower excavator consists of crawler-mounted head and tail towers with a 12-yd. Sauerman Crescent scraper operating between them. The operator sits in a cab mounted on the head tower about 60 feet above the ground—the tower itself is 140 feet high—and pulls the scraper with overburden towards him. The tail tower is placed at varying distances from the head tower according to depth, width and profile of the cut desired.

Power for the main 600-hp motor-generator on the head tower comes from a line which encircles the mine. Substations feed both towers.

Basic Operations

The mining cycle at Velva has four basic operations. First, the tower excavator strips the major portion of the overburden and moves spoil away from the coal face enough to provide an economical cut for the stripping shovel and space for shovel spoil. It transports material away from the mining cut enough to give additional spoil room and spreads out the spoil over a large area to prevent slides from unstable material. If the highwall is unstable and has a tendency to slide, the machine also lowers height of the highwall to the point of stability, carrying material back on the dump banks far enough to insure stability.

While working on a cut, the tower engineer moves his machine sideways

• Left: The 140-ft. high head tower of the tower excavator unit in operation at the Truax-Traer Co. coal strip mine at Velva, N. Dak. Originally built for levee work, the excavator with its 12-yd. Sauerman Crescent scraper removes about 7,500 cu. yd. of overburden every 24 hours.

• Below: Here another tower excavator unit with a 15-cu. yd. Sauerman Crescent Mammoth scraper pulls back overburden preparatory to a shovel cut at Truax-Traer's Red Ember mine at Fiatt, Ill.

on signal as does the tail tower man. When a cut is finished, there is an average of 15 feet of overburden left for the 10-yd. stripping shovel to remove. This shovel opens up enough space for several cuts and a track berm. Then the coal is mined in cuts 45 feet wide by a 3½-yd. shovel loading to 10-ton rail cars. When a cut is completed, the tower excavator is moved to another pit.

At the new pit a roadway is prepared for the excavator to advance 250 feet. The cycle is then repeated, the tower pulling overburden over into the cuts from which the 3½-yd. shovel had previously removed all coal.

8-Month Working Year

Because of the severity of North Dakota winters, the machine is shut down during the very cold weather. Production is scheduled for a year's output to be completed in seven to eight months. The tower excavator strips, on the average, 7,500 cu. yd. every 24 hours.

Truax-Traer has another Bucyrus-Erie tower excavator at its Red Ember mine at Fiatt, Ill. This machine handles a 15-yd. Sauerman Crescent Mammoth scraper. Sauerman has built a tower excavator for Consolidated Diamond Mines, Ltd., Africa, for overburden removal from diamond deposits.

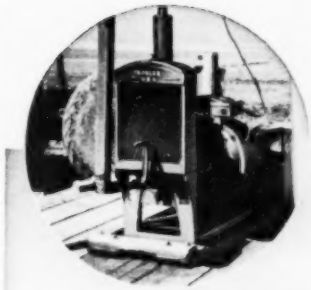
Noble Appointed Engineer For N. J. Turnpike

Charles M. Noble, Princeton, N. J., has been loaned for six months by the New Jersey Highway Department to serve as chief engineer for the multi-million-dollar New Jersey Turnpike. Noble has had 30 years of engineering experience, on highways as well as on harbor development, bridges, tunnels and naval bases. He served as a special engineer on the Pennsylvania Turnpike and for 13 years was an engineer with the Port of New York Authority on projects which included the Lincoln Tunnel and the George Washington and Goethals Bridges. He has been highway engineer in the New Jersey department since early in 1946.

Turnpike to Cost $200 Million

The turnpike which he will supervise for six months is expected to cost more than $200 million at latest indications and will be one of the most heavily travelled roads in the country. The toll super highway will extend 130 miles from George Washington Bridge near the New Jersey-New York border to Deepwater, N. J., on the Delaware River.

When the new turnpike is completed sometime in 1951, it will be one of the most modern multi-lane highways in

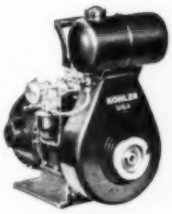


Kohler Electric Plant at base of tower. This unit also served 2 adjoining towers.

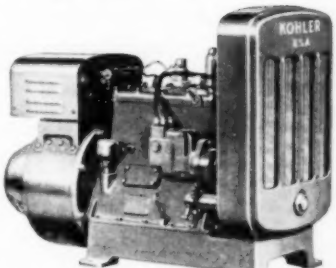
Row of 45-foot floodlight towers at Cherry Creek Dam.

Skid-mounted floodlight towers at Cherry Creek Dam powered by

KOHLER
Electric Plants



Model 350M21-K7, 350 watts, 115 volt AC. Manual control. Length 17⅜", width 11⅜", height 16⅛".



Twelve skid-mounted lighting towers floodlighted the night shift at Cherry Creek Dam, the main purpose of which is to prevent flash floods in the city of Denver. The towers were skidded to the center line of the dam at night and moved to one side during the day. Kohler Electric Plants supplied the current for individual towers or groups of two or more.

This is but one of countless examples of the steady, reliable service which Kohler Electric Plants provide for major construction projects throughout the nation and in many other parts of the world.

Stand-by protection is another vitally important service provided by Kohler Electric Plants. In industrial plants, municipal buildings, stores, schools, hospitals, theatres, homes and farms, they safeguard life and property by assuring uninterrupted operation of electrical equipment when storms or accidents cause failure of central station service.

Sizes range from 350 watts to 10KW including two new portable plants, one rated 350 watts, 115 volts weighing 70 pounds and another 500 watts, 6-12 volt battery charging weighing 77 pounds. Because of their light weight and small dimensions, both models have many uses in the construction market. Write for illustrated folder D-7, Kohler Co., Kohler, Wisconsin.

Model 3A21, 3KW, 115 volt AC. Length 41", width 16", height 27¼".

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PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS

● Pacific Coast Aggregates, Pleasanton, Calif., uses this 35-ton Caterpillar-powered Industrial Brownhoist with 2-yd. clamshell bucket to handle aggregates at its Eliot plant. The unit moves material from stockpiles to railcars and vice versa.

the world. There will be no grade intersections or traffic lights. All intersecting roads will pass over or under the highway, and it is estimated that savings in travel time will amount to as much as 40% as compared to presently available highways.

The 130-mile highway will serve, in addition to New Jersey's own automobiles and trucks, those out-of-state vehicles from the north, south and west, which constantly use the state's highways to and from New York City and other points in New York State as well as to and from New England areas. Because of the problems which must be solved to take the turnpike through the highly congested industrial area from Elizabeth to Fort Lee and the Jersey meadows, a stretch of about 20 miles, it is expected to be one of the most expensive construction projects in American history.

The turnpike will be financed by the sale of revenue bonds by the New Jersey Turnpike Authority through several hundred banking houses throughout the country. The offering of bonds is expected to be made by the end of the year—the issue will be the largest of its kind in bond history. The bonds will be secured and pledged solely by revenues from the new turnpike.

Actual Work to Begin This Winter

Land acquisitions will begin before or as soon as the bonds are issued, according to Paul L. Troast, Authority chairman. Preliminary engineering surveys and studies for this highway, are already under way. All engineering surveys are expected to be available to the Authority by the middle of next month. Actual construction work probably will begin sometime this winter in the southern section.

Howard, Needles, Tammen and Bergendoff of New York will be overall consulting engineers. Coverdale and Colpitts, and Ammann and Whitney, also of New York; Edwards and Kelcey, Newark, N. J.; Frederick R. Harris Inc., Elizabeth, N. J., and DeLeuw, Cather and Co., Chicago, are other engineering firms which will work on the turnpike.

Turner Appoints Tuttle

The Turner Construction Co. has elected Edward X. Tuttle to the position of vice-president in charge of new business with supervision of contract negotiations at the firm's four offices in New York, Boston, Chicago and Philadelphia. He succeeds J. P. H. Perry who will continue as vice-president and consultant on new business. Tuttle will headquarter in New York.

Butler Makes News as "Dean of Ore Muckers"

Emmett Butler, grand old man of the iron range and oldest active iron miner in the United States, was the subject of a recent feature article in a Minneapolis newspaper. The article traced briefly the early work of the Butler brothers—first as engineering contractors and after 1902 as strippers on the Mesabi iron range. (See *Excavating Engineer*, Nov., 1948, p. 22.) Mr. Butler, who is 79, estimates he has had a hand in digging over 250 million tons of ore and has been closely associated with enough stripping to fill the Mahoning pit, largest open cut iron mine in the world.

Because most of the high ore content mine fields had been taken up by the steel operators before the first Butler arrived at Hibbing, Emmett said he and his brothers amassed their fortunes from the "left-overs" and by doing it the hard way. Most of the Butler's major competitors were mining from fields rich in iron content and it wasn't too long before Emmett's company ran into trouble. About 1925

Continued on page 64

Australia's Airport

Continued from page 27

To fill in this area and raise the area between the swamps and the sewer lines, an additional eight million cu. yd. of fill are required. To secure the fill a special dredge has been designed by the engineers of the Department of Works and Housing and three have been constructed in Sydney. They will be used to pump sand from the bottom of Botany Bay in that section where a proposed flying boat landing will be located. The dredges will each have a projected output of 3,000 cu. yd. per day.

Sand will be pumped through 6-in. steel pipes direct to fill areas and to stockpiles for loading to trucks. It will also be pumped to the river bed when the last filling is done there just prior to diversion.

Before Muddy Creek can be widened at the point where it will join the river, the Metropolitan Water, Sewerage and Drainage Board will erect a new viaduct to carry the outfall sewer lines. The viaduct, whose construction cost is estimated at one million dollars, will be built without interruption to existing lines. Of reinforced concrete, the structure will have a center span of 60 feet with a 9-ft., 3-in. clearance at high water. The foundations which are being put down for the 560-ft. viaduct will be based on rocks, its piers handled by the normal caisson system.

The present viaduct carries one 20-ft. main and another 10-ft. one. The new line will combine them into one main 3-barrelled channel with an overall out-

side measurement of 33 ft. 10 in. x 7 ft. 10 in. It is expected that work on the viaduct will have advanced enough by the beginning of next year to begin the widening of Muddy Creek.

Master plan for the development of the airport was prepared under the supervision of senior airport engineer, Dr. K. N. E. Bradfield of the Department of Civil Aviation. It provides for development in four stages until eventually the airport will be able to handle up to 500 land- and sea-based craft daily. Stage four provides for a seacraft landing base in Botany Bay adjoining the existing airport site.

The new runway will be able to withstand a tire pressure of 300 psi. At least 850,000 square yards of pavement will be laid before the entire plan is realized. Crafts up to 300,000 pounds will be able to use the new site.

Detailed plans for each section of the work are prepared by the staff of the Department of Works and Housing while actual excavation and construction work is handled by the New South Wales Department of Public Works using its own staff. The Works Department in turn charges the cost to the Department of Civil Aviation plus a fee for overhead and supervision.

Work on the diversion cut could go ahead faster were it not for the construction of the traffic bridge and the sewer viaduct which must be completed first. However, when diversion and fills are completed, 1,200 acres will have been added to Kingsford-Smith airport, providing ample room for extended runways located to suit prevailing winds.

Crawlers

Continued from page 23

swaying. The machine should always be started or stopped slowly and smoothly, especially when travelling with a load.

The operator should watch his footing in soft sand or similar material. If the machine is worked in one position without moving for a considerable length of time, the treads can mire down in soft material. If this occurs, the operator should start travel with care, being sure that treads are not dirt bound.

When operating in soft ground with the temperature below freezing, it's good practice to move the machine at night onto hard dry ground or mats,

Continued on page 50

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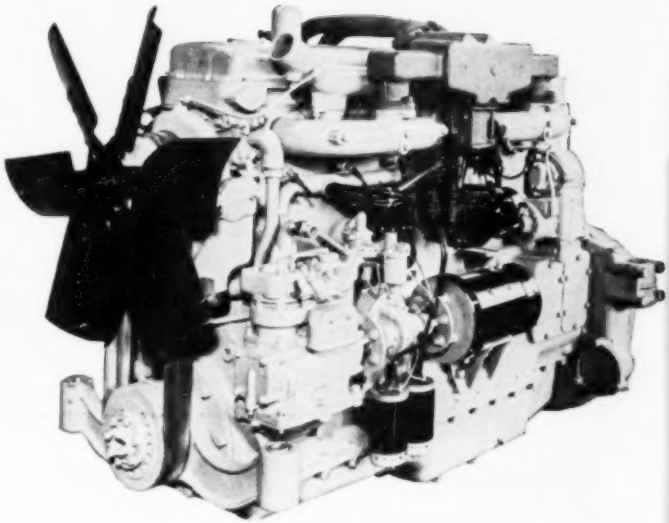

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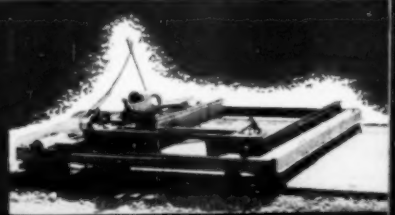

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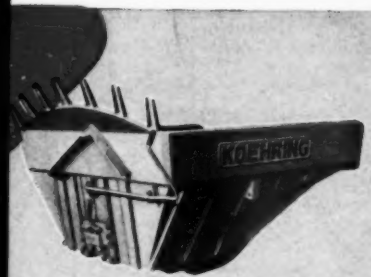
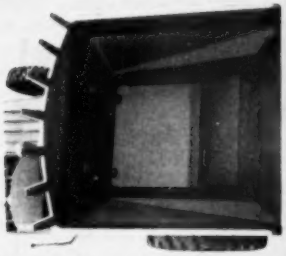


DUMPTOR BODY HEAVILY REINFORCED All-welded sides, ends and bottom of heavy-duty 6-yard Dumptor body are heavily ribbed with 4" channels. High-carbon steel gives extra strength and protection at stress points...where the abrasive action of rock handling is most severe.



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. . . Operator trips body release lever . . . gravity instantly tilts scoop-shaped body. One second later, load is out and Dumptor is off for another load. No slow-moving body hoists . . . no body hoist maintenance.

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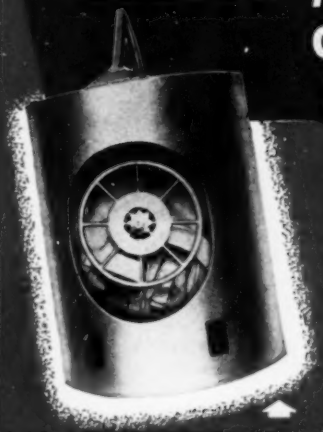

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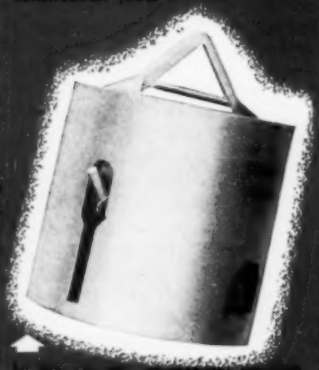

½ TO 1½-YD. JOHNSON FINGER-TIP CONTROL buckets are ideal on general construction, for handling normal-slump concrete of average-size aggregates. Single-lever-operated. 3 sizes.

1 TO 8-YD. LO-SLUMP handles any stiffness of concrete . . . has built-in vibrator. Extra large, double-class discharge can be operated manually or by compressed air. Adjustable rubber seal makes bucket gas-tight. 2, 3, 4 and 8 cu. yd. sizes for

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STREET.....

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KOEHRING PRODUCT

C.S. JOHNSON COMPANY
Champaign, Illinois
KOEHRING SUBSIDIARY

Crawlers

Continued from page 47

and to free cats of mud. Otherwise, the operator may find his machine frozen in solid by morning. Not only will a great deal of work be required to break the rig loose, but in the process the propelling machinery may be overstrained and parts broken.

Cleats Improve Traction

If the machine shows a tendency to slip on icy or frozen ground, the operator should put bolts or lugs into holes in tread pads to increase traction. A practical and cheap cleat can be made from a short piece of chain with both ends fastened to tread holes by bolts. Steel to steel contact is slippery in wet, snowy, or frosty weather. Under such conditions, ramp, trailer, or car surfaces contacting treads should be sanded.

Never apply travelling friction any harder than is necessary to make the machine move. If the machine stops abruptly, never force friction in or apply power with force. Something may have fallen into treads or they may have caught on sprockets. To force travel under these conditions might result in damage to the travel mechanism. Instead, travel slowly in reverse and then try going forward again. If the treads still act locked, the operator should locate the trouble before again attemping to move.

Lubrication Suggestions

Lubrication of crawlers presents some special problems. Heavy loads and dirty working conditions make frequent lubrication vital. If neglected, grease holes plug up inside of tumbler and idler shafts and it is practically impossible to get grease to bearing surfaces unless the part is removed and grease hole drilled out.

Drive chains should be lubricated at least once a shift with used engine oil or equivalent. Lugs on treads should be similarly lubricated at least once a shift. If the machine is travelling for any considerable distance, application should be more frequent—at least once an hour for steady travelling. Lubrication of drive chains and lugs to resist rust is particularly important when a machine is to be stored for any length of time.

Lubrication of roller and tumbler bearings is oftentimes neglected when the machine is not doing much moving. However, lubrication of these bearings

• Operator should watch his footing in soft sand or similar material.

is extremely important when a shovel, for instance, stands in one spot to dig for long periods. The constant rocking back and forth squeezes out grease causing a metal-to-metal contact at the bottom of the bearing. When treads "ripple" during digging, wear is often greater than that resulting from travel.

Under these conditions, greasing alone will not lubricate the bearing adequately. After lubrication, the ma-

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chine should be moved back 100 feet or so and returned in order to provide rotation to distribute grease throughout each bearing.

Always keep some kind of oil around the tread adjusting nuts and screws. Once lubricant has penetrated around the threads it will remain for some time. A small amount of time and effort spent here will make the tread adjustment jobs far easier. It is important to keep treads and drive chains properly adjusted to prevent their coming off tumblers or sprockets and to reduce backlash and wear.

The operator who follows the simple rules outlined in this article will be rewarded with relative freedom from crawler troubles.

Daytona Beach

Continued from page 29

and will make it more difficult for plant roots to work into the joints. It will even stop Turk's Cap, a species of the lily and worst offender of the many plants which dot Florida's landscape.

Largest pipe in the system went into the 24-in. gravity and 20-in force lines, all of which are in the city. Eight miles of these lines lead from various sections of the city to the treatment plant at Bethune Point. This new plant, built in 10 months at a cost of $224,937, $1,456 under the original estimate, not including equipment, is now pumping and treating daily about two mgd. When all sanitary sewer lines throughout the city are completed, the plant will handle four mgd. Its peak capacity is seven mgd.

Quillian finished the plant in May. Infilco, Inc., of Chicago, and Eimco Corp., West Salt Lake City, Utah, supplied the custom-built equipment.

Pipe Requirements

Olson Corp., Beresford, Fla., is laying 20-in. sanitary sewer pipe for about 3,000 feet under the Halifax River which divides the mainland from the Peninsula. Frank Construction Co. completed another underriver 16-in. water main to the peninsula to provide that area with insurance against a stoppage should the present main fail.

Engineers recommended cement asbestos pipe where it could be used. It is made in 13-ft. lengths—longer than other types—which cuts down the number of joints, and, consequently, seepage. This move hastened comple-

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tion because the asbestos pipe was readily available.

Completion of all sanitary sewer and water projects now under contract is expected this month with about 400 working days checked off. Eighty per cent of the $4¼ million project will be finished with a large number of extensions and reconditioning jobs on the mainland and a new sewer on the peninsula still to be done. Construction of seven new wells—contract is still to be let—will add a million gallons a day to Daytona Beach water supply. The new wells will reduce the possibility of drawing up salt water in the existing well system.

The new network is designed to accommodate a potential population of 70,000, well above the present 30,000 living in the city and surrounding areas. During the tourist season and times of national conventions, 50 to 60 thousand visitors have crowded into the city. The new line will adequately serve any population increase, either temporary or permanent, for many years to come.

Rampart

Continued from page 21

at the beginning of this work will be passed over the first concrete poured. The sluiceways built in this section of the dam will assist in handling any normal flow.

Plan Completion by End of 1951

When the spillway crest reaches its height, tainter gates will be set. A structural steel bridge will be built over the spillway—final topping out will be the construction of the roadway over the high section of the dam to make another link in binding together the states of Georgia and South Carolina. Allstates plans to finish all work by the end of 1951. Contract expires in Jan., 1952.

The powerhouse is not a part of the present contract. Bids for its construction will be asked for in the Spring of next year.

Clark Hill Dam is being handled by the South Atlantic division of the Corps of Engineers, Savannah district, where Maj. William H. McKenzie is acting district engineer. Grady L. Bain is resident engineer. Allstates Constructors, Inc., is directed by C. D. Riddle, chief engineer for Walsh Construction Co.; C. H. MacLeod, Walsh, administrative officer; the writer, Walsh, office engineer. C. E. Murphey, job superintendent, and T. F. Taylor, project engineer, were engaged by Allstates for this job.

FOR HARDFACING AND REPAIR

Amsco WELDING PRODUCTS

Amsco NICKEL-MANGANESE

Amsco Nickel-Manganese filler bars and electrodes built up this dipper used in the rugged service of a northern iron ore mine. For buildup and repair work on manganese steel, Amsco Nickel-Manganese will provide a long wearing surface to resist heavy impact and abrasion. Nickel-Manganese electrodes are cold drawn rods, provided either coated for D.C. and A.C. or bare for D.C. welding. Weld deposits surface harden to 450-550 Brinell under cold working and have a toughness and ductility which approaches that of standard 13% manganese steel. Drilling sheaves, spindles, crossings, wobblers, crushers, and hammer mills are other applications where Nickel-Manganese has proved its value. Amsco cast and rolled repointer bars, plates, and hardfacing rods are also available. Write for Bulletin 10-A and W-1 for sizes and types of bars.

Ask for new booklet: "The Metallurgical Background for Welding Manganese Steel"

Brake Shoe AMERICAN MANGANESE STEEL DIVISION
373 EAST 149th STREET • CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo. Offices in principal cities. Made and sold in Canada by Canadian Ramapo Division of Joliette Steel Ltd., Niagara Falls, Ont.

HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD CO.
52-54 Church Street
New York, N. Y.

"ROLLS WITH THE PUNCH"

of BUCYRUS ERIE Bullgraders-Bulldozers

The rolling action you see here is a result of two recognized features of Bucyrus-Erie Bullgraders and Bulldozers: (1) Perfect *balance* between B-E equipment and the tractor; (2) The scientifically curved B-E blade.

Whether you use cable or hydraulic control this is a one-two punch combination that really peels the dirt off in a smooth easy roll—gives you faster, cleaner earth-moving on the job. Watch a Bucyrus-Erie outfit on a hill or side slope and see how *balance* keeps it level — without nosing down. Watch it perform in sticky mud or loose sand.

Your International Industrial Tractor dealer can give you the full story on why more dirt "rolls with the punch" of a Bucyrus-Erie Bullgrader or Bulldozer.

BUCYRUS-ERIE CO., So. Milwaukee, Wis.

MORE REASONS WHY BUCYRUS-ERIE UNITS HIT HARD AND FAST

- Blade mounting allows free track oscillation without changing blade angle.
- Bullgrader blade angled or tilted in few minutes by one man.
- Box girder frame plus flame hardened weldments give great strength.
- Proper sheave alignment for long cable life.
- Operator has clear vision in sitting position.
- New power control winch means easier operation.
- World-wide service through International dealers.

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See Your INTERNATIONAL Industrial Tractor Distributor

Ideas

Continued from page 39

rollers is the reason for the life extension. It has been proved that hardfaced rollers definitely cause less wear on track rails.

The automatic method has these distinct advantages: Completely uniform deposits are continuously welded at a much higher welding speed; welding

● A set of rollers and idlers are ready for re-assembly on a tractor after automatic hardfacing. The surface of these parts is sufficiently smooth in the as-welded condition to be satisfactory. The welding time varies from 30 minutes to one hour each depending upon the extent of wear. The usual amount of alloy material is four to six pounds per roller and consists of two or three passes to bring the part up to original size.

efficiency is higher since no hardfacing alloy is lost in stub ends; and deposits are far superior to the best manual welding.

Fabricating Process

Automatic hardfacing wires are produced on special machines which form a continuous tube from mild-steel strip; the granular or powdered-alloying ingredients are added as the strip is being formed. This fabrication method permits the production of material of higher alloy content than is possible to obtain in a conventionally drawn wire, yet retaining sufficient flexibility for coiling and unreeling during automatic welding. Most automatic electric heads now on the market will handle the tubular hardfacing wires or can by minor feed mechanism changes be adapted to them.

Wire in tubular form permits an almost unlimited variety of alloys. Iron-base materials can be produced with alloy content as high as 60%.

Hardfacing Alloys Available

Most of the hardfacing alloys now available as manual electrodes can be made for automatic application. One group of hardfacing wires is made with alloy content varying between 5 and 10%. These materials have hardness values ranging from 35 to 55 Rockwell C hardness. Deposits of these materials possess good abrasion resistance in combination with impact strength and are low in cost.

Another group of hardfacing wires includes those containing alloys from 10 to 35%. This group of materials can be made with a high carbon content to provide excellent resistance to abrasion or they can be made with alloys which impart heat and corrosion resistance. Tungsten carbide tube-type material is also available for automatic electric application to parts subject to severe earth abrasion. — *From a paper by H. W. Sharp delivered at a meeting of the American Welding Society and the American Society for Metals at the Western Metal Congress.*

Lubricant Handling

When a large volume of lubricants is used on a job, a central oil storage house, set apart from other units, is the best policy—it is safer as well as more economical. Storage facilities should be close at hand to reduce transportation costs. Doors and windows are best if of steel frame or roller design, fitted with wire glass and automatic closing devices. Storage on wood floors should be avoided — oil and grease soaks into them, creating a dangerous fire hazard.

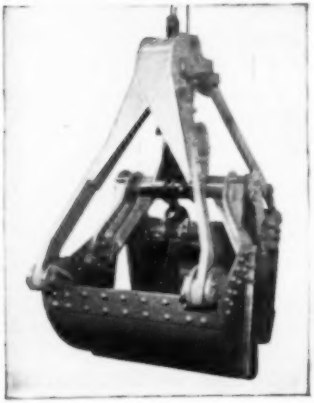
Good temperature in storage makes it possible to handle all types of lubricants more efficiently. Wide temperature fluctuations cause condensation of moisture in containers.

Where lubricants are stored in barrels or drums, hoisting equipment should be handy. Oil drums should be kept on end. One man should be responsible to check regularly to see that no water gets into open drums, that bungs and seals are tight—drum seal and bung wrenches are necessary equipment in a storage house.

Fire is always a danger where any quantity of oil is on hand. Fire protection equipment should be kept close by and checked regularly. Sand boxes for fire protection are necessary but should be kept far enough away from oil containers because of the damaging abrasive nature of sand. A regular clean-up routine of all storage facilities as well as of machinery and equipment, especially following a regular lubrication job, will cut down fire danger. Oil-soaked cloths belong in metal containers, should be washed before they are used too often.

—*Ernest W. Fair*

ERIE BUCKET CATALOG *Shows*



Gross Loads for 43 Standard 2-Line Buckets in 9 Materials

Write for a copy of Catalog 2L-2. Compare your present bucket performance to see if you are getting the most from your crane. Or send us size and make of crane and materials handled, giving present bucket output. We'll give you Erie's proved bucket performance for your crane.

Erie makes 4 standard types of 2-line buckets in 43 sizes.

ERIE
STEEL CONSTRUCTION COMPANY
458 GEIST ROAD • ERIE, PENNSYLVANIA

Notes from the manufacturers

General Motors Corp., GMC Truck & Coach Division, Truck Division, Pontiac, Mich., has made several personnel changes. R. C. Woodhouse, formerly GMC regional manager for the Southwest has been promoted to assistant general sales manager of the truck division at Pontiac. R. E. Holsaple, formerly zone manager for GMC in Charlotte, N. C., is now metropolitan sales manager in charge of GMC's four retail operations in Chicago. He is succeeded by G. R. Blackburn who, for the past few years, has headed the sales organization and analysis department at the GMC factory in Pontiac. A. B. Campbell, formerly Blackburn's assistant, will succeed him. W. P. Smith has been made retail store manager in Cleveland, taking over this position from Glenn G. Bennett who has resigned to take a GMC dealership in Phoenix, Ariz.

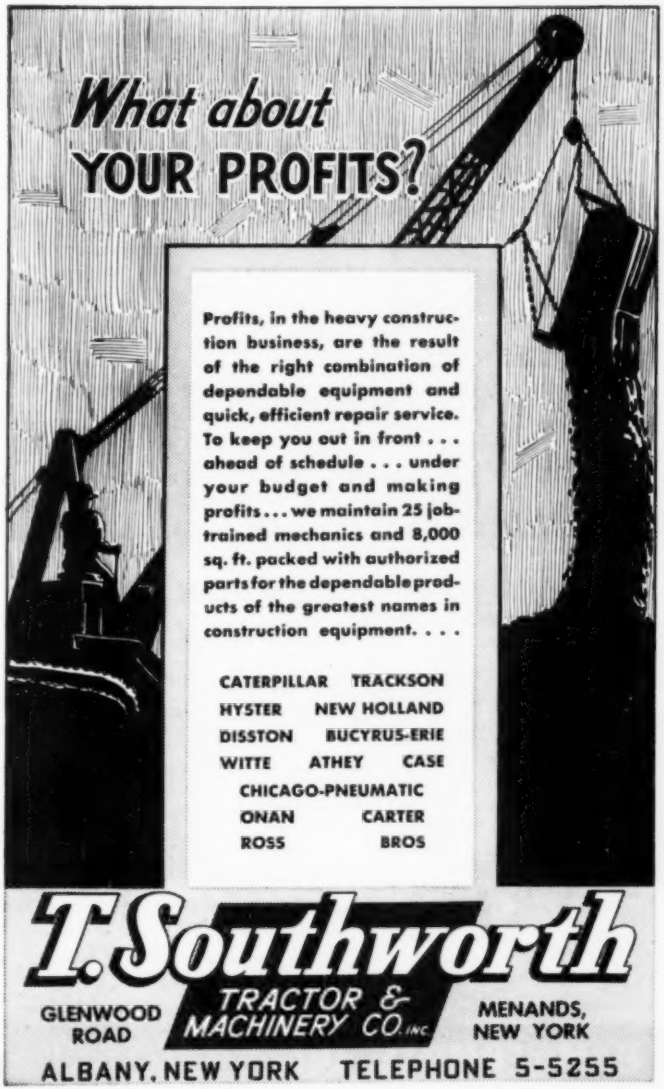
Hobart Bros. Co., Troy, Ohio, has appointed Virginia Welding Co., 114-116 Virginia St., E., Charleston 1, W. Va., distributor for the full line of Hobart welding equipment. The company covers most of the counties in West Virginia.

ACF-Brill Motors Co., Hall-Scott Motor Division, Philadelphia, Pa., has announced the appointment of Fred T. Cushing as eastern sales manager, with headquarters at Philadelphia. Cushing will supervise Hall-Scott engine activities east of the Rocky Mountains and work with users in industrial service, oil field equipment, truck and special equipment. His previous position was that of sales engineer for Hall-Scott.

Athey Products Corp., Chicago, Ill., has appointed two new representatives. Reid Evans is the new district representative for the North Central area. He will serve the upper Midwest. Evans was formerly branch manager of the Ohio Machinery Co. at Toledo, a position he held for two years. He has been with the equipment industry for 16 years, having been employed by Caterpillar Tractor Co. and LaPlant-Choate Mfg. Co. He also served five years with the Corps of Engineers. Evans' headquarters will be maintained at Urbana, Ill. The second appointment is that of Marvin B. Stanley as sales and service representative for the Southwest territory serving California, Nevada and Arizona. He is formerly service representative for the Pacific Coast which position he has held since joining Athey in 1940. For 12 years he worked closely with equipment operation in road and dam construction. He will maintain headquarters in San Leandro, Calif.

Noble Co., Oakland, Calif., has announced the appointment of William H. Schutte, formerly vice-president of Western Pipe and Steel Co., to the vice-presidency of its newly-created steel forms division. H. L. Vines has been promoted from general sales manager to vice-president of the batching equipment division. Vines joined Noble four years ago.

United States Rubber Co., New York, N. Y., has appointed F. M. Urban as sales manager of engineered rubber products. Urban joined the U. S. Rubber Co. in 1929 as a salesman at the company's Chicago office. In 1935 he was named assistant district sales manager there. Urban was merchandise manager for the mechanical goods division at the time of his present appointment. In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YOUR PROFITS?
Profits, in the heavy construction business, are the result of the right combination of dependable equipment and quick, efficient repair service. To keep you out in front . . . ahead of schedule . . . under your budget and making profits . . . we maintain 25 job-trained mechanics and 8,000 sq. ft. packed with authorized parts for the dependable products of the greatest names in construction equipment. . . .
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This Sauerman Slackline Cableway digs gravel from lake and keeps screening plant supplied with 75 tons an hour.

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Your next dig-and-haul job will move faster and pay off in real savings if you use the Sauerman method. With a Sauerman Scraper or Cableway you can reach out across a wide area, digging, hauling and dumping in one operation. Digs under water as readily as in dry earth. Requires only one man at the controls and power consumption is remarkably small, whether electric, gasoline or Diesel. Installation cost is low and maintenance simple.

Let us recommend the right type of machine for your class of work. Send for our illustrated Catalog and tell us about your own problems.

SAUERMAN BROS., Inc.

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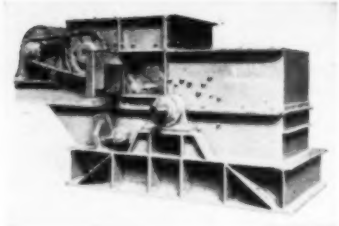
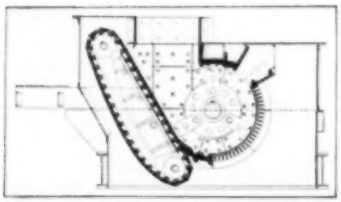


CRUSH-SHRED PULVERIZE

...any reducible material — *regardless of moisture or plasticity*



PRIMARY • SECONDARY FINE REDUCTION

1 to 1000 TONS PER HOUR

Submit your reduction problems to our engineers.

Completely illustrated booklet on request.

HAMMERMILLS, INC. 1021 BIG BEND BLVD. ST. LOUIS, MO.

this capacity he will headquarter at the company's Fort Wayne, Ind., plant.

Stoody Co., Whittier, Calif., has added the following distributors to its organization: Mobile Welding Supply Co., Inc., 2 Government St., Mobile, Ala.; Morris, Wheeler and Co., Inc., Fox St. and Roberts Ave., Philadelphia, Pa.; Maine Oxy-Acetylene Supply Co., 7 Minot Ave., Auburn, Me.; The Alfred B. King Co., 200 Winchester Ave., New Haven, Conn.; Fuller Supply Co., Inc., 12 Liberty St., Utica, N. Y.; and Corp Bros., Inc., 28 Mason St., Providence, R. I. Two foreign distributors have also been named: Manuel Sigren, Casilla 2697, Santiago, Chile, who covers the entire country; and Bandeira De Mello S. A., Av. Pres. Wilson 198--Sala 603, Rio de Janeiro, Brazil, who will represent the organization in the central area from Bahia to the State of Santa Catarina.

Four Wheel Drive Auto Co., Clintonville, Wis., has named M. O. Stockland, Jr., advertising and sales promotion manager as director of sales. Robert L. Koehler, who held the position, has resigned after 12 years of sales administration work with FWD to join in a partnership with Oscar E. Betow and John E. Battes in the FWD Pacific Co., Los Angeles, distributor for the firm in California. Battes leaves his post as FWD's western zone sales manager to join the partnership. G. F. DeCoursin, manager of production planning at FWD, will be Stockland's assistant.

Aro Equipment Corp., Bryan, Ohio, has appointed The Aro Sales & Service, Inc., as its distributor for Aro Products on the Pacific Coast. Headquarters will be maintained at 2023 S. Grand Ave., Los Angeles and at 766 Brannan St., San Francisco. Sales and service for the Pacific Northwest will be handled by the Pratto Sales Co., 714 Fourth Ave., Seattle.

LeRoi Co., Milwaukee, Wis., has made several personnel changes recently. Thomas V. Shea, formerly Eastern district manager, has been named general sales manager. He succeeds J. M. Dolan who is now vice-president and general sales manager of the Hydraulic Press and Equipment Mfg. Co., Mount Gilead, Ohio. Shea is being replaced by Dick Dutton, formerly in the foreign sales department. J. E. Heuser, for many years

working in original equipment manufacturer and distributor sales, has been placed in charge of all industrial engine sales for LeRoi. The fourth appointment is that of Clyde R. Schuler as sales engineer for industrial engines.

Chain Belt Co., Milwaukee, Wis., has made several appointments within its organization recently. D. A. Kalton has been named office manager of sales and Claude Vorpahl, field manager of general service. Charles Moeller and Charles Pingry have been appointed district sales engineers to the Kansas City and Dallas offices respectively. Watkins-Aldridge Equipment Co., Ltd., S. State St., Jackson, Miss., has been named a distributor for the complete line of Rex construction machinery in Mississippi, south of and including the counties of Bolivar, Sunflower, Tallahatchie, Grenada, Webster, Clay and Lowndes.

Mack-International Motor Truck Corp., New York, N. Y., has announced the appointment of J. W. Adelung as manager of the Brooklyn branch and of W. A. Brady as manager at the White Plains (N. Y.) branch. Adelung, who was New York and New England regional director for ODT during the war, joined Mack in 1946 as manager of the company's White Plains branch. Brady has been a salesman for Mack since 1938.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced various appointments within the company. J. M. Haile, assistant industrial equipment manager, and R. F. Garity, manager of Minnesota territory have been named managers of the Eastern and Northwest territories respectively. James M. Liddy, who was industrial sales manager for the Omaha branch, has been made industrial district manager for Minnesota, North and South Dakota and Iowa. A fourth appointment is that of W. S. Barackman, formerly assistant industrial sales manager of the Kansas City branch office, to the position of industrial sales manager of the Dallas office.

Detroit Diesel Engine Division, General Motors Corp., Detroit, Mich., has developed a mobile training unit for instructing owners and operators in service and maintenance of GM Series 71 diesel engines. With this complete service training facility, a thorough course in specialized diesel engine mechanics can be conducted. Two experienced and competent instructors from the firm's service training staff handle the assignment. The unit is currently touring the country, including visits to major construction projects and GM distributor points where groups of smaller contractors' personnel can gather. Courses are of two or three days' duration. Detroit Diesel has also announced the appointment of Edward J. Scanlan as California zone sales representative covering the territory of California, Arizona and Nevada. He will have offices in the vicinity of San Francisco.

Hewitt-Robins Inc., Hewitt Rubber Division, Buffalo, N. Y., has appointed the Bornell Supply Co., Inc., 180 E. Main St., Piqua, Ohio, as distributor of the company's industrial rubber products in Piqua and surrounding territory. Hewitt-Robins has also made Thomas P. McNiesh and Hall S. Derkin sales representatives in the Los Angeles and Chicago territories respectively.

TOP PERFORMANCE . . . Because bucket bites in fast, due to correct angling of teeth and cutting edge . . . because high arch lets material in or out quickly, for heaping loads . . . because it's balanced to carry without bobbing or spilling, and dumps are fast and clean.

MAINTENANCE ECONOMY . . . Because RED ARCH buckets are designed for speed and strength . . . built of specially developed alloy steels, specially processed. Upkeep costs are low because of RED ARCH durability.

GREATER OUTPUT . . . Because RED ARCH buckets are ahead in performance, maintenance economy and long life. That means more hours on the job, delivering bigger yardages over the "long pull" — the kind of dependability that spells profits! 20849C

THREE TYPES AVAILABLE — FOR MEDIUM, MEDIUM HEAVY, AND HEAVY DUTY DIGGING. SIZES: ⅜ to 30 CUBIC YARDS.

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Break Away from Expensive Methods!

Repair WORN Equipment with . .

MANGANAL

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11 to 13½% MANGANESE-NICKEL STEEL

Flat—Round—Square—Special Shape

APPLICATOR BARS

• Tractor Grousers Rebuilt with Manganal Special Shape Applicator Bars and Electrodes.

Puts your working equipment back on the job with a minimum loss of time. Use Manganal applicator bars for replacing worn metal on tractor grousers, clamshell bucket lips, for making grates, etc. Easily fabricated. Grows harder in use, up to 550 Brinell. Tensile strength up to 150,000 p.s.i. For accelerated repairs at lower cost, there is no substitute for Manganal applicator bars.

FREE: Write for Copy of the "MANGANAL MARKETER" TODAY!

STULZ-SICKLES CO.
SOLE PRODUCERS
91 N. J. Railroad Ave. Newark 5, N. J.

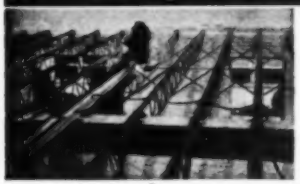
NAME OF NEAREST DISTRIBUTOR ON REQUEST

New trade literature

Title: **Hose Catalog**
Subject: A line of industrial, commercial and general purpose water hose is the subject of a new catalog. Helpful data on the construction, maintenance and use of water and water suction hose made for the construction industry is included.
Where To Get: New York Belting and Packing Co., 1 Market St., Passaic, N. J. (Free)

Title: **Open-Pit Mining Film**
Subject: Methods and equipment used in excavating nickel-copper ore from an open-pit mine are portrayed in the 19-minute film, "Man-Made Canyon." It features a picture story of the operations from drilling and blasting, through loading by shovels and hauling to final dumping at the crusher. Maintenance and service phases are also included. The film is free of advertising matter.
Where To Get: Bureau of Mines, Motion Picture Distribution Section, 4800 Forbes St., Pittsburgh, Pa. Requests should state that the borrower

A Complete Money-Saving Welding Service



Welding the framework of a modern building with P&H mild-steel electrodes.

Model WN-200 welding range 30 to 260 amps. Air-cooled gasoline engine. Equipped with power take-off for operating AC electric tools, even while you're welding. Available with skid or portable mounting. Portable units can be towed at highway speeds.

Welders, Electrodes, Instructions for Fabrication, Maintenance and Repair

Here's what you get:

- A factory-trained weldor to help you with your welding problems.
- Your choice of a welding machine from a complete line ranging in size up to 625 amps. —including 2 portable gasoline-engine models.
- Mild steel electrodes for any fabrication job.
- Four different Hartop hard-surfacing electrodes with hardness ranging from Rockwell C-40 to C-63. These electrodes are specially developed to resist abrasion, shock, and impact.
- Moly-manganese electrodes for building up high manganese steel parts that must resist impact and abrasion.
- Lime-ferritic electrodes for easy welding of "hard-to-weld" high-carbon, alloy, high-sulphur, free-machining, and cold-rolled steels.

Keep your costs down. Make your jobs run smoother. Use P&H welding equipment. Prompt attention is at your fingertips—just phone your nearest P&H distributor

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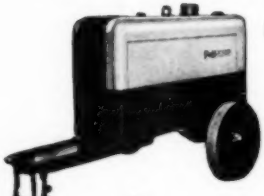


WN-300 range 30 to 375 amps water-cooled gasoline engine. This efficient unit available in 2 and 4-wheel mountings.

P&H hard-surfacing electrodes rebuild dipper teeth and many other things better than new.

has a 16-mm sound projector and an experienced operator and should be accompanied by postage (not money) from Pittsburgh to the borrower's post office. There is no other charge for loan of the film, but the borrower will be expected to pay for damage other than ordinary wear and tear.

Title: **Loader Publication**
Subject: A 24-page, 2-color publication with a heavy cover contains a large number of operating views showing various loaders at work in different parts of the world. Main parts are individually illustrated.
Where To Get: Euclid Road Machinery Co., Advertising Manager, Cleveland 17, Ohio. (Free)

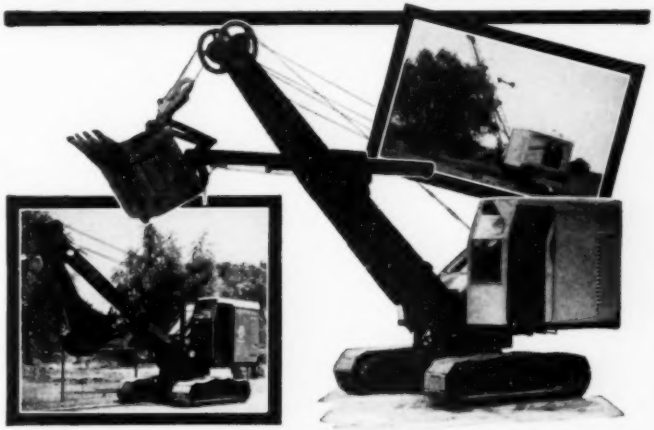
Title: **Hardsurfacing Guide**
Subject: A chart, applications for hardsurfacing electrodes, procedures for use, and results are included in a new guide. Instructions are clear and to the point.
Where To Get: Lincoln Electric Co., Cleveland 1, Ohio. (Free)

Title: **Welding Catalog**
Subject: The pages of a new catalog form a guide for the welder covering various types of equipment necessary for acetylene and oxygen operations. It contains over 150 illustrations with text that explains each item in detail and gives specific recommendations for its use.
Where To Get: Modern Engineering Co., Dep't. 122, 3415 W. Pine Blvd., St. Louis 3, Mo. Ask for Catalog No. 140. (Free)

Title: **Motor Grader Booklet**
Subject: This 16-page booklet illustrates various uses of the motor grader on road maintenance such as precision ditching, bank shaping, mixing road surfaces, terracing, and snow removal. Performance records

Continued on page 62

A PIONEER
of Small Excavating Equipment
...AND STILL A LEADER!



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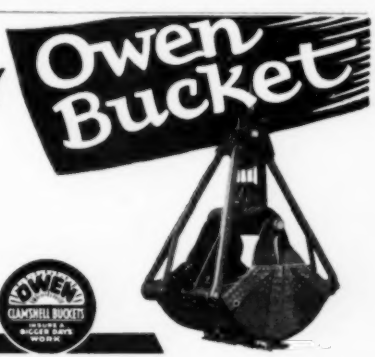
Diesel, Gas, and Electric Powered . . . Wheel and Crawler Mounted. ½ and ¾ Cu. Yds.

Generals have always been known for speed . . . for strength and power . . . for flexibility . . . for the ability to take punishment day after day and still give uninterrupted performance. Constant improvement of the product through new engineering developments, has added to that reputation.

A typical General achievement is the self-propelled one-man, one-engine crane, on rubber. Similarly, the new General crawler-mounted shovels, cranes and draglines, etc., are making an enviable record of out-performing all other types of equipment of comparable rating. Write today for the latest details.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS
THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR
MARION OHIO
DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

L-O-N-G-E-R SERVICE LIFE IS SOLD WITH EVERY



Grit-proof bearings for Alemite lubricated center shaft minimize wear on hinge castings. Wide bearing surfaces also reduce wear and assure permanent shell alignment.

Owen hinge stop design holds bottom sheave block upright and broad counterweight is shaped to protect cables and sheaves from contact with abrasive materials. Yes, Longer Service Life is sold with Every Owen Bucket.

THE OWEN BUCKET COMPANY
6095 BREAKWATER AVE. • CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.
OWEN CLAMSHELL BUCKETS BUILT TO DIGGER DAYS WORK
A MOUTHFUL AT EVERY BITE

NOT in the *Contract*

The small town hotel manager walked up to the visiting contractor.

"Your room is ready now," he said, "but because of the shortage of help, you'll have to make your own bed."

"Oh, I don't mind making my own bed."

"That's fine," said the manager, "here's a hammer and saw."

The squaw and papoose were on the platform at a jerkwater stop in South Dakota when the train pulled in. A contractor from the East pointing his finger at the papoose, inquired: "Him Injun?"

"Him part Injun, part injineer!" replied the squaw.

"At last," groaned the elderly diner, "total paralysis of the left leg. I've feared it for years."

"If it will relieve your mind any," whispered the sweet and more or less demure young thing on his left, "it's my leg you've been feeling."

"Does that Mrs. Gabber talk much?"

"Does she? You ought to have seen how sunburned her tongue was when she came back from her vacation."

The three-year-old and his father were being pushed toward the rear of the rapidly-filling elevator. A kindly woman turned to the dad and said. "Aren't you afraid your little boy will be squashed?"

"Not a chance lady," answered the father. "He bites!"

The house guests were assembled with their hosts in the living room after dinner, chatting pleasantly when the 5-year-old daughter of the host appeared suddenly in the room, her clothes dripping with water. She could scarcely articulate, so great was her emotion, and her parents rose in consternation as she entered.

"You—you," the little girl babbled pointing to the male of the house guests. "You are the one who left the seat up."

"Okay, you win! I'll let you talk to your girl friend in Des Moines!"

Woman (opening the door of her refrigerator and finding a rabbit sitting inside): "What are you doing in here?"

Rabbit: "This is a Westinghouse, isn't it?"

Woman: "Yes."

Rabbit: "Well, I'm just westing."

"What is home without a mother?" the young operator asked with a sigh.

"I am, tonight," replied the little blue-eyed blond.

The successful retired contractor decided to take up golf. He was dubbing down the fourth fairway on his first time out when a golf ball struck him on the head, knocking him out.

Several golfers rushed him to the clubhouse and laid him out on a bench. In a few minutes the old man opened his eyes and inquired "Who hit me?"

"I did," replied one of the players.

"I'm going to sue you for five thousand dollars!" said the victim.

"You can't collect," replied the golfer, "I yelled 'Fore!' just before I shot."

The old contractor sat bolt upright on the bench and bellowed, "I'll take it!"

Contractor: "I want a reliable truck driver who takes no risks."

Applicant: "I'm your man, sir. Can I have my salary in advance?"

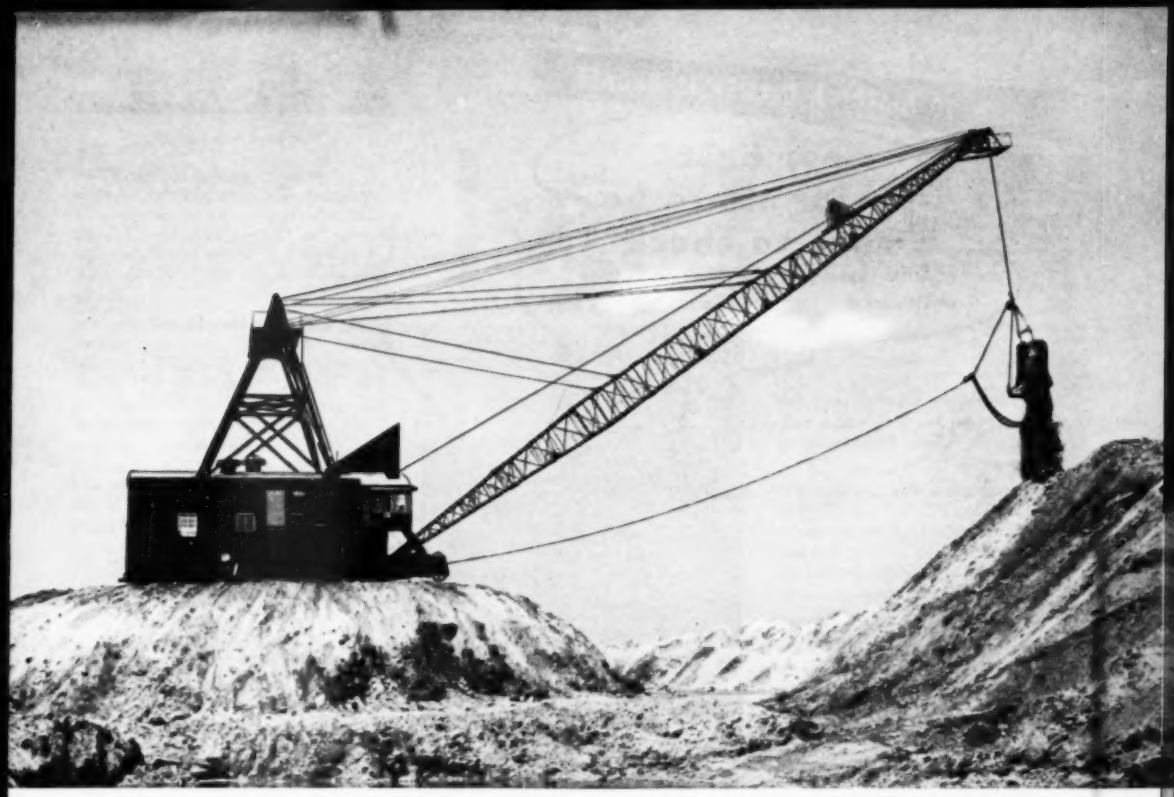
"So Liz is sore at her husband? I thought he was perfect. He always turned over his paycheck to her on the first of the month."

"Yeah, but she just found out he gets paid on the fifteenth, too."

When the newlyweds boarded the train, the embarrassed groom tipped the porter liberally not to disclose that they were just married. Next morning, on the way to breakfast in the diner, they were greeted with many grins, stares and craning necks. Furious, the groom upbraided the porter.

"Nassuh, Boss," George replied. "Ah didn't tell 'em. When they asked me if you was just married. Ah says, 'No suh, dey is just chums.' "

Contractor Jones, a good family man, had been inveigled into a poker game, and experienced growing apprehension as the hands of the clock moved relentlessly on toward morning. Finally, at 3 A. M., he had a sudden inspiration. He called his home, and when his wife answered the phone, he shouted, "Don't pay the ransom; I'm back!"



An Appetite for Overburden

Where overburden is the problem, the answer is a Bucyrus-Erie walking dragline like the 7 to 10 cubic yard 9-W pictured above . . . for Bucyrus-Eries offer a line-up of job-proved features that mean big output wherever they go to work. Simple, sturdy design and construction mean reliable operation — important when working far from repair facilities. A dependable, strong walking mechanism means exceptional maneuverability, a smooth walking action without jerks or shocks — so Bucyrus-Eries can always work in the most effective digging and dumping positions, can move safely and surely over loose sand, soft ground, around obstacles. Long ranges and fast operating cycles mean big yardage capacities — the "appetite for overburden" that spells profitable operation. Bucyrus-Erie walking draglines are offered in a wide variety of bucket sizes and boom lengths to fit your job requirements.

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

37M49C

The Best Buy Bucyrus . . . The Best Buy In Excavators

HOW TO SELECT A CLAMSHELL BUCKET

For best performance be sure to check

- Crane Capacity
- Work To Be Done
- Clearances
- Bucket Type and Size

The difference between peak and ordinary bucket performance depends on close observance of these basic factors.

Determine the *closing line pull;* also *size* of closing and holding cables. The *allowable gross load* is the closing line pull or the safe working gross load . . . *whichever is less.*

Consider *headroom clearance* and any other *space limitations.*

Determine the *character of the material* to be handled or excavated.

Then select the *type, size* and *weight* of bucket, and the proper *accessories* to make the bucket adaptable to your operations.

Blaw-Knox can best give you the engineering service that makes possible proper selection of the bucket suited for your needs.

There are many practical and profitable suggestions on bucket performance and use in Catalog 2076. Send for your copy today.

BLAW-KNOX DIVISION of BLAW-KNOX COMPANY

2074 Farmers Bank Building
Pittsburgh 22, Pa.

BLAW-KNOX CLAMSHELL BUCKETS

THE MOST COMPLETE RANGE OF SIZES AND TYPES

New Trade Literature

Continued from page 59

of projects throughout the nation are included. Design highlights of various models are also presented.

Where To Get: Caterpillar Tractor Co., Peoria 8, Ill., or any Caterpillar dealer. Ask for Form 12258.

Title: **Welding Handbook**

Subject: A 32-page, illustrated pocket-size combination handbook and catalog lists All-State rods and fluxes. It contains tables of characteristics, full application information, and helpful hints of general interest. Among the new products listed is a cutting electrode, a tinning rod and a sampler kit containing silver solder and ten other types of gas welding rods with appropriate fluxes.

Where To Get: All-State Welding Alloys Co., Inc., 273 Ferris Ave., White Plains, N. Y. (Free)

Title: **Diesel Magazine**

Subject: A 24-page magazine for power users features articles on the development of Cummins diesels. Other illustrated accounts tell the story of the use of these diesels on different jobs.

Where To Get: Cummins Engine Co., Inc., Columbus, Ind., or Cummins dealers. Ask for "The Dependable Diesel." (Free)

Title: **Conveyor Bulletin**

Subject: A 4-page catalog illustrates and describes a new sectional conveyor and shows its various adaptations. Specifications are presented, and line drawings showing design and mountings are also included.

Where To Get: George Haiss Mfg. Co., Inc., 4700 W. Division St., Chicago 51, Ill. Ask for Bulletin No. H-487. (Free)

A ROCKING BEAM Trailer?

YES HERE IT IS!

Rogers also builds trailers for unusual needs, embodying characteristic features of fundamental design but modified to meet the special requirements.

For example, consider the above illustrated

ROGERS TRAILER

• This is the new Model T trailer which has two rocking, box-girder sections at each end of which is a spindle, carrying a wheel and two extra large tires. This design gives the desired oscillation and permits building trailers only 8 feet wide in capacities up to 35 tons. This two axle trailer meets the needs existing in some states that limit the tonnage that can be carried on one axle.

Write for information on standard or special trailers which have been tested in difficult service.

ROGERS BROS. CORP.
136 ORCHARD ST. ALBION, PA.

EXPERIENCE . . . . builds 'em
PERFORMANCE . . . . sells 'em

TO ADVERTISE: All advertising in this section is payable in advance. Rate: 60c per line, or $7.20 per inch of 12 lines. Minimum charge $2.40. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date — 15 of preceding month. Example: January closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

Bucyrus-Erie 200-W diesel dragline. Midwestern location. Can be inspected on work to be complete by October 1. Good condition. Favorably priced. Box 3346

Bucyrus-Monighan 3-W diesel dragline late 1939, good operating condition, 90 ft. boom, 3 yd. light bucket, Fairbanks-Morse engine, central location. Box 3348

New Bucyrus-Erie 200-W diesel dragline, never used, immediately available, central location. Box 3350

One Bucyrus model 78-C, serial No. 4348, steam powered, crawler mounted shovel with 3-yard cast dipper, also extra dipper, needs boiler work and hoist chain, baiance machine good condition. Located Central Texas. Box 3342

Northwest Shovel

¾-yard gas engine driven, working; recently overhauled. Dirt Cheap.

Machinery and Supplies Company
2000 Walnut Kansas City, Mo. VI. 2512

1—Bucyrus-Erie 10-B combination ⅝-yd. dragshovel and clamshell machine with Buda gasoline engine, solid type dragshovel dipper 29" wide and 28' clamshell boom without bucket. Machine shop No. 18143. Box 3347

Northwest model 25; 6; 80D; 95. Manitowoc 3500; 4500 new — will rent. Bucyrus 54-B; Monighan 5W; 7W; 9W; 450.

A. W. Nevers Phone 32 Mt. Pleasant, Iowa

Marion 37 steam shovel equipped with 1¾-yard dipper. Overhauled last winter, boiler refired, steam piping renewed and engine repacked. Box 3343

Bucyrus-Erie 50-B Ward-Leonard horizontal thrust coal loading shovel. Good operating condition. Location Middle West. Box 3341

Bucyrus-Erie 44-B shovel (2-yd.) equipped with Buda engine. Complete stock spare parts to be sold with machine. Located South America, but will disassemble and load to steamer for shipment. Box 3338

NORTHWEST model 6 shovel.
NORTHWEST model 80 shovel.
Located Minnesota. Box 3329

Bucyrus-Erie 50-B steam shovel No. 10208. Located at Crosby, Minnesota. Box 3328

Placer dredges, 4½', 6', 7½', elec., diesel.
Bucyrus 50-B 2-yd. steam shovel, crane.
Whirley gantry crane, elec., 120' boom.
60-ton steam barge crane, 75' boom.
Buckeye trenchers, 120, 160, 201, 203, 224.
Air compressor, 1574', diesel, 300 HP.
Nordberg 1250 HP diesel elec.-gen. units.
Crushers, gyratory, jaw, rolls, mill.
Whitcomb 7-ton gas dinkey, 36" ga., reblt.
Porter, Vulcan 18-ton steam locos., 36" ga.
Browning 25-ton locomotive crane, diesel.
Shovels-draglines-cranes, 1¼, 1⅝, 2½-yd.
B-Erie 2½ yd. shovel front att., 52-B-55B.

H. Y. Smith Co., 829 N. B'way., Milw. 2, Wis.

A standard shovel front, ¾ yard capacity, for a Lorain 41, purchased in March of 1947. Good shape. Contact Mr. P. C. Cochrane, contractor, of Sanford, North Carolina.

Two Bucyrus-Erie model 27-T blast hole drills, gasoline powered, completely overhauled, including 6" tools. Located northern Minnesota. Box 3345

Used Equipment For Sale

Bucyrus-Erie 10-B ⅝-yard shovel. General condition exceptionally good. Motor overhauled within the last six months.
Buckeye 71 ¾-yard backhoe. Excellent condition. Very reasonable.
TD-9 IHC tractor with Bucyrus-Erie front end loader. Good shape.
HD-7 Allis Chalmers tractor with Gar Wood hydraulic bulldozer. Just overhauled and in excellent condition.
Portable Telsmith crushing plant. 18 x 32 jaw. 28" cone.

E. F. Craven Company
Box 538 Greensboro, North Carolina Phone 3-5521

1—Shovel front end for 2½ yd. 54-B Bucyrus-Erie complete—brand new.
2—1947 HD-10 dozers.
2—1947 HD-14C dozers.

UDELSON TRUCK SALES, Inc.
3218 Woodland Avenue
Cleveland, Ohio

Pull shovel attachment for modern Bucyrus-Erie 38-B, 2 cu. yd. bucket, excellent condition, located Western Massachusetts.

The Tuller Construction Co., Red Bank, N. J.

3—Dart model 120 tractors with 25-ton Austin-Western coal haulers in good working condition. Tractors or trailers available individually.

Reid-Holcomb Co., Inc.
1815 Kentucky Ave.
Indianapolis, Indiana

Hystaway crane, dragline and clamshell buckets for Caterpillar D5, used 350 hours. Robert Montealm, Munising, Michigan.

SHOVEL FRONT complete for model 70 Buckeye ¾ yd. machine. Perfect condition.

Nesbitt Equipment Company P. O. Box 11
Alexandria, Virginia
Telephone: OVerlook 3886

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AUDEL Publishers
49 W. 23 St. New York 10, N. Y.

1—Bucyrus-Erie AXY Red Arch, 8 cu. yd. dragline bucket together with 103 parts and accessories. Mid-western location. Slightly used. Box 3335

New Diesel Engines

2—Caterpillar D-8800 diesel engine, 4 cylinder 5⅜" x 8" with accessories.
1—Buda Lanova 4-DT-226 diesel engine 4 cylinder 3⅞" x 5⅛" with accessories.

Being Offered at Bargain Prices
Bucyrus-Erie Company South Milwaukee, Wis.

Placer Gold Dredge

8 cu. ft. diesel-electric, Bucyrus-Erie bucketline dredge and necessary auxiliary equipment for a one dredge operation will be sacrificed at fraction of replacement cost. Dredge is in good mechanical condition; was built new in 1940. Digging depth, 30 ft. below water.

Equipped with two Ingersoll-Rand type S diesel engines, Byron-Jackson pumps, electrical equipment all General Electric. Sectionalized steel pontoon hull. Complete specifications and price on request. Dredge can be inspected in running condition at Sunbeam, Idaho. Address inquiries to Box 3337 care of Excavating Engineer.

Bucyrus-Erie 29-T diesel drill, No. 21264, caterpillar type mounting Caterpillar diesel engine. Recently overhauled. Ready for immediate shipment. John Pitcher, 7108 Mission Street, Daly City, California.

Two AX 7-yd. Bucyrus-Monighan Red Arch dragline buckets with teeth and chains. A-1 condition.

Atlas Coal Company, Inc.
Oskaloosa, Iowa

New Dragline Buckets

2—1¼ cubic yard Red Arch Type AX medium duty buckets.
2¼ cubic yard Red Arch, Type AX medium duty bucket.
2½ cubic yard Type AX dragline bucket. (Reconditioned.)
3 cubic yard Red Arch, Type AY heavy duty bucket.
5 cubic yard Red Arch, Type AY heavy duty bucket.
6 cubic yard Red Arch, Type AY heavy duty bucket.

Bucyrus-Erie Company
Parts Division
South Milwaukee, Wisconsin

Bucyrus-Erie No. 8 bit dresser. Complete and in perfect operating condition. Located in Washington State. Box 3271

Continued on page 64

For Sale

Continued from page 63

Bucyrus-Erie 29-T electric blast hole drills arranged for operating on a power supply of 220/440 volts, 3 phase, 60 cycle current. Each drill equipped with a string of drilling tools, drilling line, sand line, bailer, circle jacks and a set of wrenches. Drills are available in the West and are to be reconditioned before sold. Box 3340

WANTED

Wanted—for a one-yard Osgood Conqueror gas shovel serial number 2282, one 55 foot crane boom and one-cubic yard clam bucket.
Rupp Construction **Marshallville, Ohio**

Wanted: 1—120 ton per hr. rock crusher, jaw-type, capable of handling 24" to 30" sizes of rock, reducing to 3" size; also one secondary hammermill rock crusher for reducing from 3" size to fine sizes—also elevators and screens for same. Box 3349

Wanted: Complete chain crowd shovel front end equipment for Bucyrus-Erie 22-B dragline. Box 3319

HELP WANTED

Repair Foremen

Large mining firm in Chile (South America) requires two or three competent foremen to take complete charge of maintenance and training work. Duties will include supervising repair and maintenance of shovels (diesel and electric, up to 3½ cu. yds.) bulldozers, tractor shovels, air compressors, etc., and also training of local operators and mechanics. A working knowledge of Spanish is important. Must be single men. Please write giving age, and past experience. Box 3334

POSITION WANTED

Gen. supt. or supt. available. Experience covers 25 year supervising, estimating and building all classes of excavating; railroads; highways; airports; earth-fill dams; large sewers. Honest, sober, reliable. Best of references. Salary open. Box 3336

News

Continued from page 46

it was becoming nearly impossible to sell ore which had less than 58% iron content, or more than 11% sand.

In conjunction with Dr. E. W. Davis, head of the University of Minnesota iron mines experimental station in Minneapolis, Emmett developed the then revolutionary jigging process of ore refining. This process enabled the brothers to produce marketable ore from their low-content deposits.

In another joint project, Butler and Dr. Davis worked out a roasting process to refine otherwise worthless ores magnetically. During World War II, Butler developed the so-called heavy media separation process which employed a solution heavier than water in washing sand out of ore.

Dr. Davis said recently of Mr. Butler: "Practically every new technique which has proven of value to the iron mining industry in the last 25 years has been brought about by Emmett Butler."

When Butler Brothers Co. disposed of its vast holdings to Hanna Coal & Ore Corp. and others last year, Emmett thought for a moment that his mining days were over. But today he is operating the Mary Ellen mine (named for his daughter) which he has owned for over 25 years.

New Resident Engineer At Meridian is R. E. Lee

Robert Edward Lee of Limestone, Me., has been named resident engineer of Meridian Dam, a Corps of Engineers project on the Middle Fork of the Willamette River, Oregon. He will maintain headquarters at Lowell, Ore. His assistant is Thomas G. Waring, acting resident engineer until Lee's appointment.

Lee was transferred from the New England division of the Corps at Boston where he was a construction engineer. Since joining the Corps he has been superintendent in charge of excavation at Gallipolis Dam and the construction of Piedmont Dam, Piedmont, Ohio; area engineer for the Providence, R. I., district; and engineer in charge of dike construction at West Springfield, Mass., and Hartford, Conn.

Meridian Dam, an earth and gravel fill, will be 250 feet high and 3,106 feet long at the crest and will have a reservoir providing usable storage of about 456,000 acre-feet at normal pool level. A major unit in the Willamette River Basin project, it will have a gravity-type concrete spillway structure. Its construction will require the relocation of 25 miles of the main Southern Pacific railroad line.

OMAHA DRAGLINE BUCKETS

Tops 'em all!

In Payload

Constant research and redesigning of Omaha Buckets has caused a saving of 25% of the total weight. This means a bigger load with an extra payload built in. With Omaha Buckets you move Dirt . . . instead of steel.

Write for complete catalog.

In Profit

Omaha Buckets make every cast and load pay off with an extra payload. In all kinds of digging the job is done quicker, easier. Operators fill their daily quotas. You'll find that on the job and on the job record, Omaha Dragline Buckets pay off with a Profit!

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DREDGES

HYDRAULIC
DIPPER
CLAMSHELL

Bolted sectional steel hulls for landlocked, inland waters

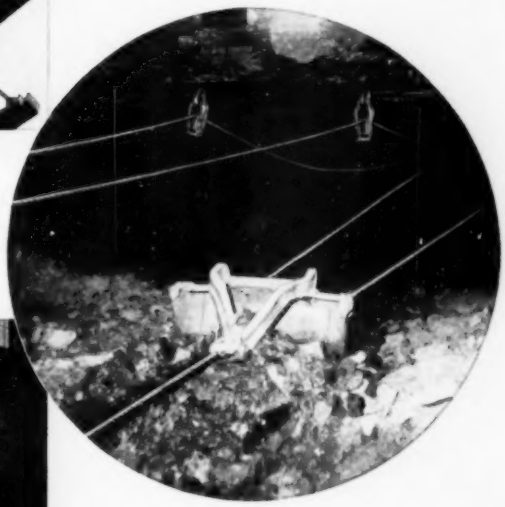
If you need a dredge, write us!

AMERICAN STEEL DREDGE CO. INC.
FORT WAYNE 1 · INDIANA · U.S.A.

DESIGNERS AND BUILDERS OF DREDGING EQUIPMENT SINCE 1905

Improved Performance with LAY-SET PREFORMED

Erecting steel for a bascule bridge requires precision of men and machines. Performance is all-important. The *improved performance* of LAY-SET Preformed crane ropes means smooth running over sheaves and good spooling on drums. LAY-SET helps speed the work.



Slusher mining is another use where performance pays off. The steadier the rope, the faster ore is moved. The tougher the rope, the longer it lasts. LAY-SET Preformed has in-built qualities which make it steadier and tougher. Its *improved performance* means more tons of ore per rope dollar.

In the mill or plant, wire rope and wire rope slings move an endless variety of materials. LAY-SET Preformed has tough improved plow steel wires, yet it is flexible. Used on cranes or hoists, or as slings, its *improved performance* means lower wire rope costs.

***When you specify** LAY-SET Preformed for any machine in industrial, mining, or contracting service, you get the best construction and best grade of wire rope for the job. Ask your Hazard distributor for LAY-SET Preformed Wire Rope—and for ACCO Registered Wire Rope Slings*

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LAY-SET Preformed GREEN STRAND WIRE ROPE

HAZARD WIRE ROPE
A DIVISION OF AMERICAN CHAIN & CABLE

TRADE MARK

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Breaking the way for 1500 Buses an hour

In the heart of New York City, a full city block is being cleared of old buildings to make room for a new $20,000,000 bus terminal. Scheduled to be completed in 1950, the terminal will handle an estimated 60,000 passengers daily—a peak load of 1500 buses an hour!

Razing the old structures is no small job in itself. Most of the buildings are of massive construction, with heavy brick walls and reinforced concrete floors, necessitating the use of dependable heavy-duty equipment.

Ingersoll-Rand portable air compressors and hard hitting I-R paving breakers are playing an important part in completing the demolition on schedule. Breaker-wise contractors everywhere insist on Ingersoll-Rand paving breakers powered by I-R Portable Compressors because years of hard service have shown them to be consistant profit makers. Before buying your next Breakers or Portable Compressors be sure and get complete information on Ingersoll-Rand equipment. There is a branch office near you.

DONT STOP WITH A GOOD PAVING BREAKER

Use the IR CONTRACTORS' COMBINATION

- *Everything you need for rock drilling.*
- *Top quality machines that work as a team.*
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